



Technical Assistance Consultant's Report

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Cambodia, Lao People's Democratic Republic, Myanmar, Viet Nam: Greater Mekong Subregion Health Security Project (Part 1/4)

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For Asian Development Bank

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Asian Development Bank

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HEALTH ANALYSIS

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For
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by
Conseil Santé



TABLE OF CONTENTS

Acronyms	2
I. INTRODUCTION	6
II. THE CHALLENGE	6
a. <i>Global Health Threats</i>	6
b. <i>Public Health Security</i>	10
III. GMS DEVELOPMENTS	12
a. <i>Economic Development</i>	12
b. <i>Vulnerable Groups</i>	15
c. <i>Health Sector Trends</i>	16
IV. GMS HEALTH SECURITY	18
a. <i>Reported Infectious Diseases</i>	18
b. <i>Public Health Security Performance</i>	19
c. <i>Legislation and Coordination</i>	21
d. <i>Surveillance and Response</i>	22
e. <i>Laboratory services</i>	29
f. <i>Infection Prevention and Control</i>	30
g. <i>CDC in Border Areas</i>	33
h. <i>Regional Cooperation</i>	35
V. DISEASE CONTROL PROGRAMS	36
a. <i>HIV/AIDS</i>	36
b. <i>Tuberculosis</i>	38
c. <i>Malaria</i>	39
d. <i>Dengue</i>	41
e. <i>Childhood infections</i>	42
f. <i>Other infectious diseases</i>	44
VI. HEALTH SYSTEM ISSUES	44
a. <i>Sector Coverage</i>	44
b. <i>Quality of Care</i>	45
c. <i>Governance</i>	46
d. <i>Financing</i>	48
e. <i>Monitoring</i>	51
VII DEVELOPMENT COORDINATION	52
a. <i>External Assistance</i>	52
b. <i>Aid Coordination</i>	55
c. <i>ADB Performance</i>	55
VIII. PROJECT DESIGN	57
a. <i>Project Outline</i>	57
b. <i>Discussion</i>	58
c. <i>Justification</i>	59
IX. CONCLUSIONS AND RECOMMENDATIONS	66
a. <i>Conclusions</i>	66
b. <i>Recommendations</i>	68
c. <i>Further Work</i>	68
Appendix 1: Problem Tree	71
Appendix 2: Surveillance and Response Issues and Options in CLMV countries	72
Appendix 3: Laboratory Services Issues and Options in CLMV countries	74
Appendix 4: Public Health Security Issues addressed by Proposed Project	76
Appendix 5: Sector Results Framework	78
Appendix 6: Major Development Partners	79
Appendix 7: GMS Health Security Project Target Locations and Populations	81

Acronyms

ADB	Asian Development Bank
ADF	Asian development fund
AIDS	acquired immunodeficiency syndrome
APLMA	Asia Pacific Leaders Malaria Alliance
APSED	Asia Pacific strategy for emerging diseases
ART	anti-retroviral treatment
ASEAN	Association of South East Asian Nations
ARI	acute respiratory infection
BOD	burden of diseases
CDC	communicable disease control
CDCD	Communicable Diseases Control Department (MOH Cambodia)
CEU	Central Epidemiology Unit (MOH Myanmar)
CLMV	Cambodia, Laos, Myanmar, Viet Nam
COP	community of practice
CPS	country partnership strategy
DCDC	Department of Communicable Diseases Control (MOH Laos)
DMF	design and monitoring framework
DOTS	direct observed treatment – short course
DPIC	Department of Planning and International Cooperation, MOH Laos
EGDP	ethnic group development plan
EGM	effective gender mainstreaming
EHF	Ebola hemorrhagic fever
EID	emerging infectious diseases
EIRR	economic internal rate of return
EMG	ethnic minority group
EOC	operation center for prevention and control of diseases
EPI	expanded program on immunization
EWARN	early warning and response network
FETP	field epidemiology training program
FMA	financial management assessment
FSW	female sex workers
GDP	gross domestic product
GAP	gender action plan
GDPM	General Department of Preventive Medicine
GFHTM	Global Fund to Fight HIV/AIDS, Tuberculosis, and Malaria
GHE	government health expenditure
DHC	Department of Health Care (MOH Laos)
DHIS	Department of Planning and Health Information Systems (MOH Cambodia)
DHS	Department of Hospital Services (Cambodia)
DMS	Department of Medical Services, MOH Myanmar
DPH	Department of Public Health, MOH Myanmar
GMS	Greater Mekong Subregion
HFMD	hand, foot and mouth disease
HIV	human immunodeficiency virus
HIS	health information system
HMT	HIV, malaria and tuberculosis
HPAI	highly pathogenic avian influenza
IHR	international health regulations

IPC	infection prevention and control
IPHCMC	Institute Pasteur, Ho Chi Minh city
IUD	injecting drug user
Laos	Lao People's Democratic Republic
MBDS	Mekong Basic Development Surveillance
MDA	mass drug administration
MDG	millennium development goals
MDRTB	multi-drug resistant tuberculosis
MERS	Middle East respiratory syndrome
MEV	migrants and mobile people, ethnic minorities, and other vulnerable groups
MMA	Myanmar Medical Association
MNCH	maternal, neonatal, and child health
MOH	Ministry of Health
MSM	men having sex with men
NCLE	National Center for Laboratory and Epidemiology, Laos
NFP	national focal point
NGO	nongovernmental organization
NHL	National Health Laboratory, MOH Myanmar
NIHE	National Institute of Hygiene and Epidemiology, Viet Nam
NIPH	National Institute of Public Health, Cambodia
NTD	neglected tropical diseases
ODA	official development assistance
OOP	out of pocket expense
PMU	project management unit
PPTA	project preparatory technical assistance
PSA	poverty and social analysis
RRT	rapid response team
SARS	severe acute respiratory syndrome
SOP	standard operating procedure
STD	sexually transmitted diseases
STH	soil-transmitted helminths
TB	tuberculosis
UNDP	United Nations Development Program
UHC	universal health coverage
VAMS	Viet Nam Administration of Medical Services, MOH
WHO	World Health Organization
WPRO	West Pacific Regional Office (WHO)
3DF	Three Diseases Fund (now 2 MDG Fund, Myanmar)

SUMMARY

The Governments of Cambodia, Laos, Myanmar and Viet Nam are proposing support from the Asian Development Bank (ADB) for the Greater Mekong Subregion (GMS) Health Security Project (the project). ADB provided project preparatory technical assistance (PPTA) to help prepare the project, including this summary of health analysis for the 4 countries and 4 country health analysis. Preparation of the health analysis entailed review of sector documents, field visits, collection of information using questionnaires, workshops, and discussions of findings and recommendations with government representatives, partners, and other stakeholders.

Emerging infectious diseases (EIDs) like avian influenza, SARS, MERS and Ebola hemorrhagic fever and recurrent diseases like cholera have the potential to spread quickly around the globe, with major economic and sometimes devastating human impact. Other diseases of global importance like HIV, TB, malaria, and dengue spread less quickly but do not stop at borders and cause major impact at household level. Drug resistance is potentially one of the most threatening emerging problems to deal with common bacterial infections, HIV/AIDS, malaria, tuberculosis, and hospital-acquired infections.

The GMS, with a population of about 327 million people in 2014, half of whom live in Cambodia, Laos, Myanmar and Viet Nam (CLMV countries) has emerged from years of poverty and conflict. With better connectivity and attractive investment conditions, industrialization has increased rapidly in CLMV countries, resulting in major migration and rapid urbanization. Per capita income has increased, poverty has halved and health MDGs have mostly been achieved in CLMV countries. However, institutional, financial and social reforms have been lagging, and inequity has increased except perhaps in Cambodia, with the lowest per capita income of the CLMV countries.

The GMS has been an epicenter of several outbreaks of EIDs, and is highly vulnerable to outbreaks and epidemics of infectious diseases. It has long borders, connectivity to major urban hubs, and a large burden of infectious diseases that spreads across borders including malaria, tuberculosis, and dengue, and a concentrated HIV epidemic cause major impoverishment. Common infections such as diarrheal diseases and pneumonia still cause most childhood mortality. Hospital-based infections and drug resistance are of particular concern.

To improve public health security, CLMV countries are committed to achieve core capacities based on the International Health Regulations (IHR) 2005 and implement the Asia Pacific Strategy for Emerging Diseases (APSED) 2010, as well as the regional strategies for the control of dengue, malaria, tuberculosis and HIV/AIDS. Despite major political commitments and support from partners, specific capacity to deal with EIDs and other health threats of regional significance is inadequate in all CLMV countries, although Viet Nam scored relatively high based on IHE evaluation instruments.

Public health security is as good as its weakest link. It requires specific public health security capacities, the focus of IHR/APSED, and general health system capacity. All CLMV countries have made major progress building up national public health systems to achieve universal health coverage as one of the sustainable development goals 2030, and are engaged in various health sector reform processes. However, demand for public health services is low due to problems of access, quality and affordability of services. Health systems in CLMV countries have been chronically underfunded and understaffed in rural areas. In particular, migrants and mobile people, poor ethnic minorities, and other vulnerable groups often do not access public

health services while being at risk of having and spreading infectious diseases. Not reaching these groups will affect goals of UHC and public health security.

In CLMC countries, ministries of health have built up public health security systems with a focus on surveillance and response and zoonosis. However, other elements of public health security, including laboratory diagnostics, hospital infection prevention and control, and linkages to communities, other sectors, private services and other countries have made less progress.

To assist CLMV countries meet their obligations under IHR/APSED and a number of other treaties and agreements, it is proposed that the project supports expanding the surveillance and response system including risk analysis, GMS and cross-border cooperation, port-of-entry services, piloting syndromic reporting at village level, and community preparedness; and help strengthen the public health system in terms of laboratory services and hospital infection prevention and control (IPC). In Viet Nam, the project will support integration of district health services.

Within the targeted 13 provinces in Cambodia, 12 provinces in Laos, 36 provinces in Viet Nam, and 6 states/region in Myanmar, districts have been selected based on presence of borders, ethnic minorities, and poverty.

In each country, the Ministry of Health (MOH) will be the executing agency. Implementing agencies include departments in charge of surveillance and response and hospital IPC, and national laboratories. Targeted provincial and state/region health offices will also be implementing agencies. In view of staff and administrative constraints, a project management unit (PMU) is proposed. The total project costs is estimated at \$128 million for ADB out of a total of \$1352 million.

The main project risk is that project-facilitated health services do not reach vulnerable groups in border areas. This risk will need to be mitigated through participatory planning, mainstreaming outreach in annual operational plans and budgets, and logistic and technical support. Other project risks are limited financial management and procurement capacities for external aid, in particular in MOH Myanmar. The PMU will need to build up MOH capacity in these areas.

I. INTRODUCTION

1. The Greater Mekong Subregion (GMS) covers the Kingdom of Cambodia, the People's Republic of China¹, the Lao People's Democratic Republic, the Republic of the Union of Myanmar, and the Socialist Republic of Viet Nam. Of its total population of 327 million people in 2014, close to Europe's population, about 168 million, half the GMS population, live in Cambodia, Laos, Myanmar and Viet Nam (CLMV countries).

2. The Asian Development Bank (ADB) has been assisting CLMV countries in the area of communicable diseases control (CDC), in particular the control of emerging infectious diseases (EIDs) and major regional infectious diseases including HIV/AIDS, tuberculosis and malaria (HTM), dengue, and neglected tropical diseases (NTDs). Part of this assistance was channeled as subregional projects through the GMS Economic Development Program, a partnership of the 6 above countries and development partners with ADB as secretariat. It has 7 core programs including for human resources development covering education, health and labor. ADB has also provided regional and country-specific assistance for CDC.² ADB seeks to combine country assistance for CDC under one umbrella, with country specific, sub-regional or regional projects.

3. On request of CLMV Governments, ADB has included the GMS Health Security Project (the project) in its GMS partnership strategy and country partnership strategies. The project is estimated to cost \$132 million. ADB will finance \$125 million including \$21 million ADF loan for Cambodia, \$8 million ADF grant and \$4 million ADF loan for Laos, \$12 million ADF loan for Myanmar, and \$80 million ADF loan for Viet Nam. The Governments will provide about 5% in direct counterpart funds, in addition to its indirect contributions. The project is scheduled for approval in 2016.

4. ADB approved project preparatory technical assistance (PPTA) to help prepare the project. ADB engaged the consulting firm Conseil Santé to carry out the PPTA. The PPTA team comprised of 7 international experts and 4 national teams of 20 experts in all. From July 2015 to June 2016, the PPTA team conducted 4-5 missions to each country, often accompanied by ADB staff, to conduct the subsector analysis, discuss issues and priorities, develop the project scope and implementation arrangements, and examine risks and safeguards.

5. The final report consists of 3 parts. Part I, this report, presents the situation analysis. Part II presents the project proposal and implementation arrangements. Part III presents assessment of gender, safeguards and risks including technical, gender, social, environmental, economic, financial management, and procurement assessments.

II. THE CHALLENGE

a. Global Health Threats

6. The Center for Disease Control, Atlanta, lists about 50 emerging or re-emerging diseases (EIDs).³ An EID is defined as: *An infectious disease that is newly recognized as occurring in humans; one that has been recognized before but is newly appearing in a different*

¹ Yunnan Province and Guangxi Zhuang Autonomous Region

² See Table 12 and Appendix 6 for a list of projects.

³ Center for Disease Control, Atlanta.

*population or geographic area than previously affected; one that is newly affecting many more individuals; and/or one that has developed new attributes (e.g., resistance or virulence).*⁴

7. Some historians say that epidemics have killed more people than war and poverty. Historical pandemics are the pest, small pox, and the Spanish flu. More recently, only HIV/AIDS has been at this scale, resulting in a decline of life expectancy in some countries such as Botswana. Most outbreaks that occur are small and do not become an epidemic based on the World Health Organization (WHO) definition (over 2 times standard deviation above the expected). For example, the GMS countries will experience about 1,000 outbreaks each year requiring investigation and response. Most recent epidemics have been small, and/or with less mortality, but typically high economic impact compared to the number of cases because of the control measures. If it involves the productive sector, even a small outbreak may result in a decline in GDP (Hong Kong). While capacity to deal with outbreaks and small epidemics has improved substantially, health experts warn that another pandemic will happen sooner or later, likely of viral origin such as the influenza virus. Unfortunately, no one knows when that happens.

8. What experts do know is there are many viruses circulating that can cause major epidemics or indeed a pandemic, and also drug resistant bacteria and parasites. The major problem is that microbes multiply, mutate and re-assort rapidly. Most of these new strains are not viable, or the immune system can swiftly deal with it, but sometimes a new virus or multi-drug resistant bacteria develops and spreads for which modern technology has yet to find a cure. Many RNA viruses (Table 1) including influenza, polio, HIV, dengue and measles viruses cause or caused a major burden of disease and are likely to continue doing so unless control measures are in place.

9. In terms of risk factors, the general view is that on the one hand improved hygiene and sanitation has reduced the burden of infectious diseases, and hence the risk of escalation. On the other hand, the livestock industry, poor farm biosafety, misuse of medicines, congested working and living conditions, increased use of meat products, and connectivity are some examples of possible risk factors that need to be understood and mitigated. Some of the new EIDs are of animal origin (zoonosis), like avian influenza which is still circulating in poultry. Biological terrorism also raises new concerns.

10. What we all know is that if the first cases are missed for a week or so, and the infection can be easily transmitted between people and is highly pathogenic, such as in the case of Ebola hemorrhagic fever (EHF), it can quickly escalate to the point of a national disaster, with martial law, closure of businesses and schools, restrictions of movement, shortages of food and water, shortages of utilities and health services, and isolation of affected populations. In fact, Ebola is a good candidate as it has shown to do well in more urban settings, and some patients probably remain infectious after recovery.

11. Another reason why it is important to quickly identify the first cases of any EID is that all countries lack a surge capacity for treating victims of EIDs. Highly dangerous EIDs such as severe acute respiratory syndrome (SARS), avian influenza (AI) and EHF, require special public health measures such as intensive case and quarantine. Highly dangerous EIDs can spread rapidly with high case fatality, often over 50%.

⁴ International Organization of Migration. 2003. *Microbial Threats to Health: Emergence, Detection and Response*. 2003. Adapted by Center for Disease Control, Atlanta.

12. Developed countries have very limited surge capacity to handle an epidemic of EID which often requires sophisticated equipment and isolation rooms. For example, Australia could barely handle the surge in cases from a mild swine flu outbreak. In developing countries, the surge capacity ranges from zero to few beds. For example, during the avian flu outbreak, patients with tetanus on artificial respiration could no longer be accommodated and died. The world emergency teams can barely handle one major outbreak in one country at a time, as was evident in recent EHF outbreak in West Africa. Rather than wanting to create special intensive care units, countries will need to consider alternative solutions. Fortunately, most EID outbreaks are either self-limiting or can be brought under control with basic measures such as social distancing, contact tracing and closing schools and businesses.

Table 1: Examples of RNA viruses known to cause diseases in humans

• <i>Togaviridae</i>	– <i>Alphavirus</i>	• Equine encephalitis viruses
		• Chikungunya
• <i>Flaviviridae</i>	– <i>Flavivirus</i>	• Japanese encephalitis virus
		• Dengue virus
		• West Nile fever virus
		• Tick-borne encephalitis virus
• <i>Bunyaviridae</i>	– La Crosse encephalitis, etc.	
	– Rift Valley	
• <i>Reoviridae</i>	– Coltivirus	
• Colorado tick fever virus		
• <i>Picornaviridae</i>	– Poliovirus	
	– Coxsackievirus	
	– Echovirus	
	– Parechovirus	
• <i>Paramyxoviridae</i>	– Measles virus	
	– Mumps virus	
	– Henipaviruses	
• <i>Orthomyxoviridae</i>	– Influenza viruses	
• <i>Rhabdoviridae</i>	– Rabies virus	
• <i>Retroviridae</i>	– HIV	
• <i>Arenaviridae</i>	– Lymphocytic choriomeningitis virus (LCMV)	

Source: Institute Pasteur Cambodia

13. An EID outbreak usually causes major economic impacts and an EID pandemic causes a global economic meltdown. Table 2 sums up estimates of lives lost and economic losses. It is likely that as countries develop, the human impact of epidemics will decline and the economic impact will increase.

14. Therefore, it is mandatory to invest in their prevention. Other infections of regional significance include HIV/AIDS, TB, malaria, dengue, and NTDs. These diseases may particularly affect migrants and mobile people like business people, tourists and other travelers,

cross-border ethnic minority groups, and other vulnerable groups (MEV) such as youth. A major concern is the spread of hospital acquired infections and drug resistance. Some of these diseases are considered EIDs, according to the US Center of Diseases Control definition. EIDs, major communicable diseases, and drug resistant infections require regional cooperation to bring them under control.

Table 2: List of Pandemics and Epidemics and Estimated Impact

Name	Cause	Location	Period	Cases and Risk Groups	Mortality estimates	Examples of Costs
First Plague Pandemic	Yersinia Pestis	Originating in China, spread to Middle East, Africa, Europe	540-590	Cities	Middle-East 25% Europe 50% population	Facilitated conquests
secondly	Yersinia Pestis variant strains	Originating in China, spread along silk route	1347-1351	Cities	China 50% Europe 30% Africa 15%	Major economic meltdown
Third Plague Pandemic	Yersinia Pestis	Originating in Yunnan, China	1855-1959	Shipping Hunters		Trade impact
Plague as biological weapon	Yersinia Pestis	Huns, Mongols, Turks, Japanese army during WWII	Up to 1945	Soldiers, citizen		Associated with conquest
Small pox, measles, cholera, tuberculosis, many others	Viruses and bacteria	European conquest of Americas	1492 onwards	Warriors Traders	Up to 90% of native american population	Near extinction of native american population
Spanish flu	Influenza A virus	Global, producing H1N1, H2N2, etc	1918/19	500 million	50 million	Derived strains still cause flue epidemics
Smallpox	Virus	Global	Up to 20 th c	Children more	300-500 million deaths	
Polio	Virus	Global	Until 1979	Children more	500,000	10 million disabled
Cholera	Bacteria	From Ganges in 19 th century worldwide	1991	1.4-4.3 million per year	28,000 to 142,000 death per year	1991 Peru outbreak \$700 million
West Nile	Virus	USA	1999-2001	43,937	1,911	\$400 million
HIV/AIDS	Virus	Africa, Global	1980 onwards	70 million	35 million African countries have major drop in life expectancy	About 1% of GDP
Malaria	Protozoa	Tropics	2015	2014 million	438,000 in 2015	
Creutzfeldt-Jacobs Disease	Prion	UK, from cattle with BSE	1988-2000		177	\$34 billion
Dengue	Virus	Tropics, Subtropics	1990th	3.9 billion at risk 390 million infected 96 million clinical cases	1 million per year	

Plague	Bacteria	India	1995			\$1.7 billion
Avian Influenza	H5N1	Hong Kong	1997	18	6	\$200 million
Cholera	Bacteria	Tanzania	1998			\$36 million
Nipa	Virus	Malaysia	1999	94	30	\$400 million
SARS	Virus	Asia	2004			\$50-120 billion
Avian influenza	H5N1	Korea, Guangdong, Viet Nam	2003/2004	228	181	
Swine flu	H1N1 new strain	Global	2009/10	20% of world population, 50% of all children	18,449	
Ebola HF	Virus	Tropical Africa	2014/15	28,616	11,310	\$2.2 billion in GDP losses excluding medical costs
MERS	Virus	Saudi Arabia to Korea, elsewhere	2012 onwards	1802	643	South Korea \$1 billion in lost tourism
Future H5N1 mutant	H5N1 low case	Global	?	1-3.5 billion	2-7 million	
Future H5N1 mutant	H5N1 high case	Global	?		3.5 billion	Economic meltdown

Sources: WHO, World Bank, Wikipedia. Future projections by *CDC Atlanta and **R.G. Webster

b. Public Health Security

15. The WHO, in 2007, defined health security as a set of activities, both proactive and reactive, to minimize vulnerability to acute public health events that endanger the collective health of national populations.⁵ It is a relatively new term reflecting a new era of globalization and public health threats. The WHO IHR 2005 does not mention health security, and recently also started using the term Health Resilience. Public health security has gained prominence, along with universal health coverage (or personal health security), as two complementary public health goals,⁶ one being collective and the other individual. Public health security may be considered a goal like UHC or an outcome. It may, for example, be measured in terms of health and economic impact, or more simply in terms of the occurrence of epidemics, which it is primarily aiming to avoid. An effective public health security system can be considered as an outcome, and the performance of sub-systems as outputs. There are several issues relating to public health security, in that it requires major investments without immediate and clear returns, and may therefore not be considered a political priority and a good investment; and it also needs to balance individual rights and public interests, which may be contradictory at times.

16. Public health security took on new dimensions following the outbreaks of SARS in 2003 and AI in 2004, in Southeast Asia. Recent outbreaks of EHF in West Africa in 2014, Middle East respiratory syndrome in South Korea in 2015, and Zika infection in Brazil in 2016 indicate that these EIDs pose a constant threat to the region and can have major health and economic impacts. Following several outbreaks of EIDs, there is a resurgence of political concerns about EIDs in the GMS. WHO warns that new EIDs, many of animal origin, pose a constant threat to the region. Better connectivity, urban development, and social and environment changes will

⁵ WHO. *World Health Report: A Safer Future? Global Public Health Security in the 21st century*. 2007. Geneva.

⁶ William Aldis. *Health Security as a Public Health Concept: A Critical Analysis*. Health Policy and Planning, 2008.

accelerate the spread of infections, requiring much better national preparedness and regional cooperation to bring these under control.

17. While the difficulties of investment in public health prevention have been mentioned in terms of lack of visible clear and quick returns such as in curative care, there are multiple rationales for government investment in public health security. Foremost, there is the unacceptable risk that an epidemic spirals out of control and causes major human, social, economic and security impact. This warrants a much higher investment compared to the risk of such an event from happening. But also for small epidemics, there are good reasons for government spending on public health security because of the public good nature or externalities of interventions, market failure, impact on the poor, savings through cost-effective prevention and small marginal costs rather than creating treatment capacity, and the government's capacity to mobilize resources. Public health security is also an international mandate to which all GMS countries subscribe.

18. The organization at global and regional level is complex. WHO provides leadership for the health sector, but UN agencies or regional organizations such as ASEAN will provide leadership for major outbreaks considered a disaster. There are multiple surveillance systems and response networks operating more or less in parallel that need to be coordinated in times of emergencies. Government agencies such as CDC Atlanta, research institutions such as Institute Pasteur, pharmaceutical companies and funding agencies also engage in basic research, and develop new vaccines and medicines. For example, after years of research, a promising dengue vaccine is finally being tested. For the Zika virus, a vaccine was developed much quicker and is about to go to trial. For the newest influenza viruses, a new vaccine can be developed in about 3-6 months (this indicates the importance of identifying cases early to delay the epidemic).

19. At national and subnational levels, the public health security system is one of those areas that requires a multisectoral approach. The Ministry of Health (MOH) is primarily responsible for public health security in many countries, but works closely with other ministries such as Agriculture and Labor, and WHO. In case of a major epidemic, a National Disaster Committee may take the lead in overall coordination of the response sometimes requiring the armed forces, local government, and utilities to come in, as well as the UN through specialized disaster relief agencies.

20. The International Health Regulations (IHR 2005) of the WHO provide a strong and legally binding standard for the control of EIDs and other serious public health threats, such as the spread of drug resistant infections.⁷ WHO regions also have regional strategies in place. For example, WHO's Asia-Pacific Strategy for Emerging Diseases (APSED) (2005, 2010)⁸ and other WHO regional strategies for the control of various major diseases, and for strengthening laboratory services and improving infection prevention and control (IPC) provide a good framework for building GMS health security.

21. The control of emerging and other infectious diseases requires more than surveillance and response, laboratory capacity, hospital and community preparedness, and public communication. None of these can function if the basic health system is not in place, including competent management and staff, facilities, cash flow, essential drugs, telecommunication, and

⁷ WHO. 2005. *International Health Regulations*.

⁸ WHO WPRO. 2010. *Asia Pacific Strategy for Emerging Diseases*.

community demand. Hence, the prevention and control of emerging and other infectious diseases depends on access to the health system. According to the 2007 World Health Report, sustained international disease control depends on the capacity of national health systems.⁹ This includes capacities both within and outside the health sector. As Aldis (2007) notes, strengthening of surveillance for epidemic-prone diseases brings little benefit to any country which lacks the public health infrastructure for an effective response.¹⁰

22. Unfortunately, IHR and regional strategies provide less analysis of critical health system gaps, the most important probably being lack of human resources and domestic financing. Linking surveillance with health management information systems is also important. Community engagement is another area that needs much more analysis. Hence, for public health security risk assessment, countries need to be assessed in terms of (i) general health system capacity to prevent diseases and make the population more healthy and resilient to any outbreak, and (ii) specific outbreak response capacity, at least for the first days to weeks until international resources are mobilized. Also, CDC concerns need to be better integrated in general health systems development efforts. The problem tree is in Appendix 1.

III. GMS DEVELOPMENTS

a. Economic Development

23. Following periods of colonialism, war, dictatorship and command economy, CLMV countries adopted a socialist market economy in the 1980s and are moving towards more or less state-controlled market development. The political setting is important for public health security. Laos and Viet Nam have a communist party regime, Cambodia has a dominant party regime, while Myanmar has a new democratically elected government and is in major transition after 50 years of military rule. Colonialism in the GMS has also left its marks on administration, among others.

24. The CLMV countries have gone through rapid economic development, with overall GDP growth of about 7% per year during the past decade and major increase in per capita income (Table 3). The resource-rich region is surrounded by economic power houses and increasingly engaged in the global economy. Regional security, low cost labor, and improved connectivity and business environment have contributed to a surge in regional investments. Better roads, ports and trade agreements facilitate participation in the global market. CLMV countries are industrializing, along with major investment in infrastructure, plantations and services, and resulted in a dramatic improvement of regional integration. The region now includes large urban conglomerates, peri-urban areas with intensive manufacturing and food production, in addition to intensive cultivation of rice and cash crops in river valleys and lowlands, and subsistence farming in low population highlands.

25. The GMS population of about 325 million people is largely made up of people with Chinese and Tibeto-Burmese backgrounds, with few Polynesian links, which is reflected in social structures and cultural and religious practices. Buddhism, mixed with ancestor worship, is the main religion, with minorities of Hindus, Muslims, and Christians.

Table 3: GMS Economic, Demographic and Connectivity Indicators

⁹ WHO. 2007. *World Health Report*. Geneva

¹⁰ William Aldis. 2008. *Health security as a public health concept: a critical analysis*. In *Health Policy and Planning* 2008; 23:369–375.

	Cambodia	Laos	Myanmar	Viet Nam	China*	Thailand
GDP per capita 1992	320	410	320	690	2,240	480
GDP per capita 2014 (current US\$)	1,095	1,794	1,204	2,052	7,590	5,977
GDP growth 2014 %	7.1	7.5	8.5	6.0	7.3	0.9
Poverty as % <\$1.25 per day (latest)	20.5	27.6	28	20.7	4.6	13.2
Population 1992 million	12.7	5.2	51.1	90.8	78.1	62.8
Population 2014 million	15.3	6.9	53.4	92.8	91.0	67.7
Population density 2014 per kilometer square	87	29	35	293	145	133
Urban population 2013 % total population	20	37	33	32	53	48
Net migration 2012 per million people	-150	-118	-474	-200	-1800	+100
International migration 2010 per million people	336	19	89	69	686	1,157
Emigration rate of tertiary educated population age 25+ to OECD countries 2000	21.5	37.2	3.9	27.0	3.8	2.2
Share ethnic minorities as % total population	10	35	32	14	12	10
Land Area in 1000 sq. km	181	237	677	633	513	332
Agricultural land % total land surface	32.9	10.1	19.2	35.1	54.8	43.3
Tourism arrivals million per year 2013	4.2	2.5	2.0	7.6	55.7	26.5
Cellphone coverage 2012 % adult population	129	65	10	148	80	127

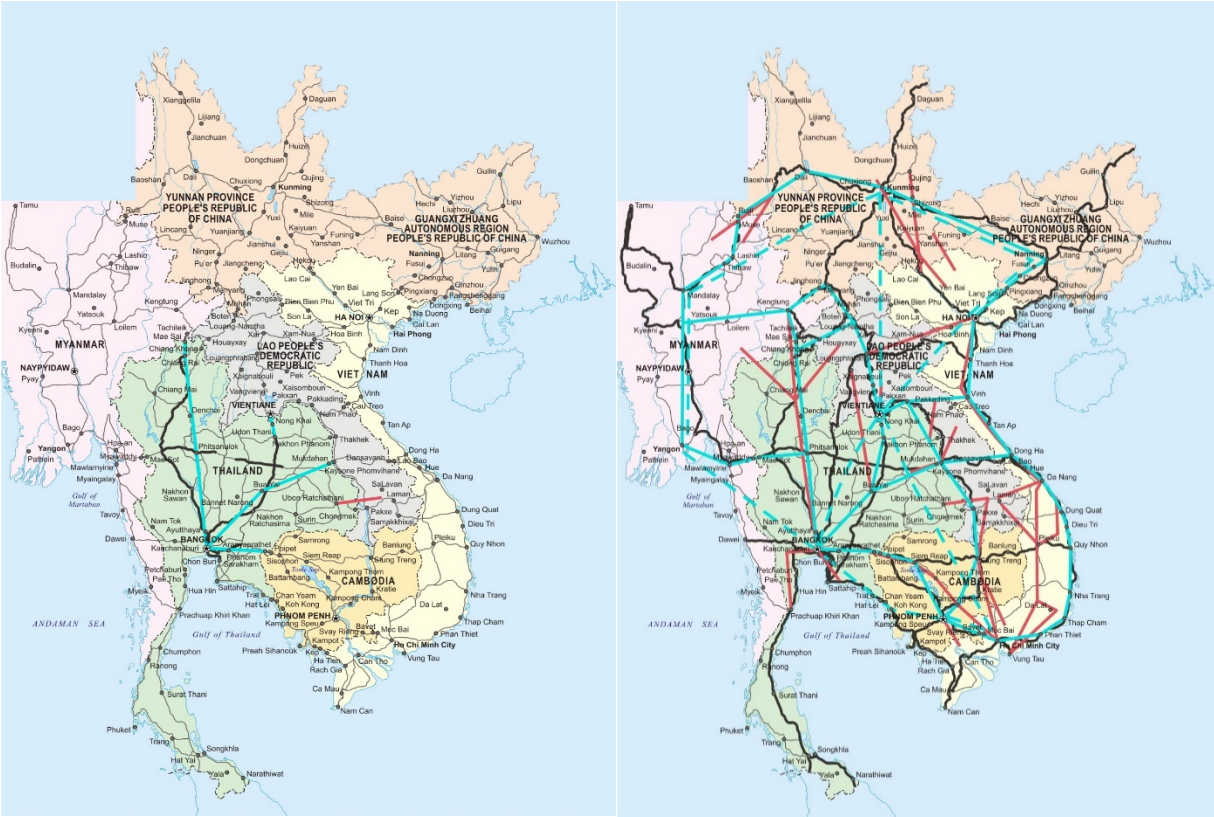
Source: World Bank 2014 except on ethnic minorities, which is from government sources.

*Yunnan Province and Guangxi Zhuang Autonomous Region except for migration statistics

26. Table 3 presents also some key demographic indicators. Comparing 1992 and 2014 population figures, it shows that population growth was slow with strong family planning policies. The population of the countries is relatively young, in particular in Cambodia and Laos. Due to a sharp drop in fertility, countries will be temporarily benefitting from a lower dependency ratio. It also shows that population density and the percentage of agricultural land under cultivation are low in Laos and Myanmar, which has implications for the cost of rural access. Among others, Laos and Myanmar, along with Yunnan, China, have large ethnic minority populations, reflecting that large parts of these lands are mountainous.

27. The GMS is going through a period of major population dynamics. Most migration is internal and seasonal, pushed by poverty and pulled by labor. Rural to rural and urban to urban migrations are less visible but substantial. Many of these migrants are poor and less educated, including large numbers of ethnic minorities. In particular in Viet Nam an estimated 10% of the population move each year which, among others, drives employers to improve labor conditions to retain workers. Major industrialization in some provinces, often facilitated by economic zones, has created local employment but also brought in large numbers of internal and foreign migrants often living in poor conditions away from family which may lead to social vices. Labor opportunities in manufacturing and services have resulted in rapid urban growth at a rate of 2-4% per year and also slum formation. The number of economic corridors with related services has developed rapidly (see GMS road maps 1992 and 2000).

Infrastructure Development in the GMS, 1992-2020



Source: ADB
 Legend: **black**=roads, **blue**=telecom; **red**=power transmission lines

28. As can be seen in Table 3, migration abroad is much less, but large numbers of the more educated persons with high school and language skills seek employment abroad, in particular to Thailand and the Middle East. Laos is also receiving many migrants, but is still losing more people. Among those completing tertiary education, often at government financed institutions, a large proportion settle abroad. In the Laos in 2000, as much as 37% of its tertiary educated population emigrated to OECD countries. While they are likely to send remittances, the opportunity costs to the government is substantial.

29. About 6% of migrants are below 20 years of age and are often victim of exploitation at work but much less of sexual exploitation. However, trafficking in women is a scourge in the GMS, including from China into the GMS, from Viet Nam to Cambodia, and from Myanmar and Cambodia to Thailand. Tourism has increased substantially, including sex tourism. Connectivity including internet and cell phone coverage stimulates education but also facilitates lifestyle changes that affect public health security.

30. More effort is needed in analyzing and anticipating the social impact of economic growth and globalization. For example, public health officials often do not know how many migrants there are living and working in their area of responsibility, do not access factories, casinos, and labor camps, and do not have a budget for these migrants. The government financing of university students who migrate abroad after completion is perhaps not a major financial loss but depletes the government of a future skilled work force with high opportunity costs. Also, the

increasing dependency on the global economy affects economic stability. CLMV countries, while showing strong economic growth, are experiencing revenue shortfalls due to the economic recession that affect total health spending, and often results in preventive services being cut more. The implications of the current economic recession on public health security needs to be mitigated, and may warrant countercyclical investments in the health sector.

b. Vulnerable Groups

31. Poverty reduction has become the global priority since the year 2000. At the Millennium Summit of the United Nations in September 2000, the UN Secretary General stated that: *“We will spare no effort to free our fellow men, women and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected.”* Two-thirds of the world’s poor live in Asia and the Pacific. All GMS countries give top priority to poverty reduction and have adopted poverty reduction strategies and plans.

32. Poverty has reduced dramatically in the GMS, and, typical for countries in transition, inequality has been increasing sharply in all countries except for Cambodia, as increased wealth and revenues mainly benefit the rich and urban people. Reducing inequity is perhaps the most important and best economic priority as this will substantially increase stability, economic growth, and wellbeing. But political and social structures are family oriented and states have difficulty implementing policies aimed at social accountability and solidarity like in north-west Europe, despite strong socialist roots.

33. The majority of the GMS countries still depend on farming for a living. Most of the poor live in rural areas and are subsistence farmers or landless workers. Agricultural productivity and prices have been increasing, thereby also contributing to better food security and nutrition for the poor. Food poverty has declined dramatically. While there are expected differences among GMS countries, there are surprising similarities in terms of pockets of residual poverty in particular affecting ethnic minorities.

34. Extreme poverty, with income of less than \$1.25 per day, has roughly halved to less than 5% of the GMS population. Based on the new poverty line of \$1.90 in 2015, about one quarter of the people in Cambodia, Laos and Myanmar are poor, and much less in other countries. Even so, this implies that there are still substantial populations living below the poverty line who have less food intake and cannot afford to pay for medical services. When looking at poor and near poor combined below \$3 per day, as much as three quarter of the people in Cambodia and Myanmar live below this and can easily slip into poverty. In fact, there is evidence that people slip in and out of poverty due to irregular household expenses such as medical services.

35. Even more so than among countries, poverty is unevenly distributed across each country, largely reflecting industrial and agricultural productivity, which in turn depends on physical and human assets, connectivity and climate conditions. On the whole, exploitation of natural resources including hydropower dams, mining, and plantations, with substantial revenue improvement, has so far brought some benefits to locally affected populations, but also caused much hardship and failed resettlement attempts.

36. The GMS includes many ethnic minority groups, in particular living in the mountains and hills. Poverty among these groups is higher than national averages, and education and health indicators are worse. Some of these groups live in socio-economic and physical isolation and do not have access to health services, in part because of cultural practices, and acceptability and affordability of health services. Infections in these communities are less likely to be reported and

managed quickly. A poverty and social analysis was conducted for each country and reported separately in Part III.

37. Geopolitical realities in these countries are complex and unstable, which may result in a short term vision and narrow focus on economic development at the cost of efforts to promote equality and social welfare. Imbalances in socio-economic development will also affect the focus on the poor and marginal groups, and hence will impact on regional health security, both directly, in terms of the potential for the spread of EIDs, and a possible resurgence of major infections such as HIV/AIDS, TB, and malaria due to activities that increase transmission, undiagnosed patients, and poor patient compliance to treatment; and indirectly through slum development, lack of investment in new medicines and services, and ecological impact. Poverty reduction is indeed closely linked to public health security for all.

c. Health Sector Trends

38. The total burden of diseases (BOD) differs substantially among GMS countries. People from Cambodia are more vulnerable than in Thailand. CLMV countries are in a demographic and epidemiological transition, whereby communicable diseases have reduced substantially, and non-communicable diseases (NCDs) and accidents and injuries have become more prominent because of changes in lifestyle and because people get older. In Thailand, China and Viet Nam, non-communicable diseases now represent about 65% of the total BOD, and include hypertension, diabetes and cancer and related causes of death such as stroke. These diseases particularly affect men over 40 years, and are related to aging, lifestyle and environment, such as smoking and use of salt and alcohol. Accidents and injuries have also increased dramatically, up to about 10% of the BOD, in particular due to road accidents. The management of these often chronic conditions is becoming costlier as demand for high tech services is increasing.

39. Among children, the major BOD in GMS countries is still infections including diarrheal and respiratory infections, dengue, and NTDs. The major causes of child mortality are perinatal conditions and infections (Table 4). The data-base is not very strong, but it suggests that childbirth and common infections need more attention.

Table 4: Major Causes of Deaths in Children Below Age 5 by Country (%)

Causes of deaths <5 yr. 2012	Cambodia	Laos	Myanmar	Viet Nam	China	Thailand
Prematurity	16	12	21	22	16	23
ARI	17	19	15	11	14	8
Birth asphyxia	13	14	12	7	15	8
Diarrhea	8	11	7	12	4	3
Injuries	8	8	8	3	13	5
Neonatal sepsis	8	7	7	6	2	5
Measles	2	0	3	2	1	1
Malaria	1	1	2	1	1	1
HIV/AIDS	1	1	1	1	1	1

Source: WHO

40. The burden of disease is not a good measure for planning overall sector spending and investment. It points at health gaps relating to lifestyle, environment and services, not at the gross financing needed to keep communicable diseases under control. The BOD for communicable diseases has reduced substantially because of major investments in treatment

and prevention, including education, nutrition, water and sanitation, and immunization. Even with a low burden of infectious diseases, financing disease control needs to be sustained to keep all kinds of infections under control. For example, what would happen if the world stopped vaccinating. Furthermore, investment needs to plan ahead, anticipating new health gaps that will require new vaccines, medicines and immunotherapy. The measure of BOD is crude, it does not consider cost-effectiveness and marginal cost factors in prioritizing disease control. GMS countries are not basing their priorities on health economics but on negotiations with stakeholders including top specialists in national referral hospitals and external partners with their own agendas. Third, infectious diseases are still the major burden for children and the rural poor, who cannot afford treatment.

41. Because of a clear commitment towards millennium development goals (MDGs), a country's performance in the MDGs reflects a country's past efforts and constraints in primary health care. GMS countries have more or less achieved MDG 4, mortality rate of children and infants decreased by 50% between 1990 and 2015. There are major variations in these indicators by income and ethnic group, as discussed in the poverty and social analysis and ethnic group development plans of this PPTA.

42. Reducing child malnutrition, under MDG 1, has been slower, in particular in Cambodia and Myanmar. Child care practices probably play a role in addition to food security and infectious disease control. Reducing maternal mortality, MDG 5, has also been challenging as it is highly dependable on access to medical services including obstetric surgery. Despite major government efforts, MDG 5 is yet to be achieved in Cambodia, Lao, and Myanmar. While health indicators have improved dramatically, the current levels are still too high compared to other ASEAN countries.

Table 5: Summary Health Status

	Cambodia	Laos	Myanmar	Viet Nam	China	Thailand
Underweight < age 5 yrs.	23.9	26.5	22.6	12.1	3.4	9.2
Child mortality < age 5 yrs.	42.5	41.9	62.4	21.7	14.6	12.3
Maternal mortality ratio	161	197	178	54	27	20
Total fertility rate 2013	2.9	3.0	2.3	1.7	1.7	1.4
HIV Prevalence 15-49 yrs. %	0.6	0.1	0.8	0.5	0.1	1.1
HIV deaths /100,000	17.1	6.4	21.6	12.1	2.8	31
Malaria cases suspected '000	152	339	2,601	3,116	5,555	1,803
Malaria cases confirmed '000	21	46	334	17	4	33
Malaria deaths /100,000	1.7	4.4	5.4	0.1	0.0	0.2
TB Incidence per 100,000	390	189	369	140	171	68
TB deaths /100,000	66	53	135	19	3	12

WHO (latest data available) <http://apps.who.int/gho/data/>

43. For MDG 6, halting HIV/AIDS and other infectious diseases, major progress has been made in reducing the epidemic in the most affected countries, Thailand, Cambodia, Myanmar, and halting the epidemic in Lao, Viet Nam and Yunnan. Even so, the epidemic continues as a concentrated epidemic in at risk groups such as drug users, sex workers, and men having sex with men. WHO is warning for a resurgence of the AIDS epidemic because of changing behavior and drug resistance, and also because current funding is insufficient to put all HIV patients on antiretroviral (ART) treatment and counseling.

44. The prevalence of TB is also very high, in particular in Cambodia. While this disease is endemic to Cambodia, war conditions aggravated the TB situation. TB is currently particularly linked to the elderly, and to institutionalized people. While there is some evidence of TB in returning migrants from Thailand (with unknown HIV status), more study needs to be made on TB in risk groups linked to connectivity, migrant labor, and poor labor and work conditions. Program funding is sufficient to put all TB patients on treatment, but a major concern is drug resistant TB, the treatment of which is much costlier.

45. New initiatives and funding from international partners for bed nets and other measures have intensified malaria control. The malaria prevalence has declined dramatically, even in Myanmar where it was the top ranked health problem. Countries are preparing for elimination and intensified control. However, there have been small outbreaks linked to resettlement of delta dwellers to malaria infested highlands, and illegal logging of migrant loggers who are hard to track as they operate at night. The main concern is artemisinin drug resistance, which emerged at the Cambodia-Thailand border where there are a large number of refugee camps.

IV. GMS HEALTH SECURITY

a. Reported Infectious Diseases

46. CLMV countries experienced a large number of isolated cases, some outbreaks, in particular food poisoning, and few epidemics (mostly dengue) in the past five years. It is difficult for staff to filter out the dangerous cases of EIDs, which are likely to show up in a hospital. Careful interview of the patient is not among the strengths of most health staff. Improving diagnostic capacity of staff is a high priority for the control of EIDs.

47. Table 6 shows the reported cases based on the current surveillance systems. However, it should be noted that many cases and some outbreaks were probably never reported, or misdiagnosed by health staff, so these data are likely overall underestimates and overestimate for specific diseases. Among others, studies have confirmed that due to poor vaccine quality, many children still get childhood infections that are not reported. On the other hand, many of the reported dengue cases are not dengue but some other viral disease caused by Chikungunya, Bunya or another virus.

Table 6: CLMV Annual Infectious Disease Burden, Latest Available Estimates

	Cambodia	Laos	Myanmar	Viet Nam
	Yearly cases, average or latest data available			
Diagnostic Category	2011-2014	2013-2015	2012-2015	2013-2015
Acute flaccid paralysis incl polio	108	24	2	1,655*
Fever & rash (measles like)	2,891	519	1,869	55,067
Measles	0	56	6	256

Neonatal tetanus	10	19	30	47
Tetanus all ages	-	21	1,372	360
Diphtheria	10	140	87	76
Pertussis	10	7	158	309
Dengue fever	14,033	1,668	Na	379,992
Acute watery diarrhea	66,078	41,290	354,024	3,591,395
Acute bloody diarrhea	na	5,870	108,346	168,238
Food poisoning	na	949	6,864	5,664
Typhoid Fever	na	1,367	4,541	4,396
Anthrax	-	4	53	472
Acute jaundice syndrome	806	691	6,706	Na
Meningitis	na	292	1,425	894
Acute encephalitis syndrome	2,577	35	na	15,547
Plague	-	-	-	6
Acute respiratory infections	712,709	3,357	2,779,392	1,455,712
Avian influenza	9	na	na	30
SARS like	-	9071	-	-
Hand Food and Mouth Disease	na	na	na	112,370
Leptospirosis	na	na	na	55
Rabies	6	1	211	426
Malaria new cases confirmed	25,152	48,071	152,159	15,752
TB new cases	43,059	30,840	138,352	49,929
HIV/AIDS new cases	1,599	3,781	7,000	72,510
HIV/AIDS total PLHIV	75,000	6,400	189,000	258,524

Source: Ministries of Health, WHO, UNAIDS. *including cases due to Japanese Encephalitis

48. The group of HIV, TB and malaria have much better surveillance systems so data are likely to be more accurate. Acute respiratory infections (ARIs) including influenza like conditions are the most common reported illness. While its diagnosis is usually clinical, it may be mixed up with EIDs, hence ARI diagnosis needs attention from a public health security point of view. Second, diarrheal diseases are often linked to food poisoning. A high level of childhood infections, even polio, suggests that despite high immunization coverage, there are program problems affecting public health security. Dengue and dengue-like conditions need earlier diagnoses, e.g., using rapid diagnostic tests, to help in timely control. Lastly, NTDs including Japanese encephalitis and less well known infections like leptospirosis and scrub typhus are likely to be missed but constitute a major burden of diseases and their diagnoses needs to be improved.

b. Public Health Security Performance

49. Public health security is as good as its weakest link. Within the GMS, PR China and Thailand have comprehensive national health security systems in place, and seek to further enhance public health security through regional cooperation, cross-border cooperation, and CDC in border areas. A good way to assess performance of the public health security system is by assessing the progress in building core capacities of the IHR 2005 and implementing the strategic areas of APSED (2005, 2010) and other WHO strategies for CDC.¹¹ IHR core capacities are assessed by countries and WHO using a standard questionnaire of some 350 questions, and cover most APSED strategic areas.

¹¹ Including bi-regional strategies for HIV/AIDS, malaria, tuberculosis, dengue, laboratory, and health financing.

50. Table 7 provides a 2015 assessment of IHR Core capacities in CLMV countries using this standard questionnaire. This is largely self-assessment by MOH officers with support of WHO (there are plans for independent IHR evaluation and APSED monitoring). What is important is to identify core capacities that are lagging or making slow progress.

51. The data in Table 7 suggests that Cambodia has the worst IHR core capacity, which perhaps reflects a more self-critical assessment of MOH; and Viet Nam the best among CLMV countries, as expected. Viet Nam MOH gives itself a very high score based on the minimum standards checklist, but in an IHR/APSED review meeting in 2015 did present shortcomings in preparedness and response.

52. CLMV countries scored 69% on average, implying that two-thirds of IHR requirements are in place, and one third remains unaccomplished. While the due date for compliance is 2016, Cambodia, Laos and Viet Nam scored 46% in 2012. In 2015, the highest scores were for coordination, surveillance and zoonosis, while in 2012 for three countries this was zoonosis, surveillance, and response. The lowest scores were for human resources and chemical and radiological hazards, while in 2013 for three countries this was risk communication, and chemical and radiological hazard.

Table 7: IHR Core Capacities Assessment 2016

Core Capacity	Cambodia	Laos	Myanmar	Viet Nam	Average 2016
Legislation	50	60	60	100	68
Coordination	55	89	94	100	85
Surveillance	80	81	73	88	81
Response	48	58	67	89	66
Preparedness	60*	71	48	95	69
Risk communication	42	62	40	100	61
Human resources	40*	44	43	100	57
Laboratory	40	78	77	100	74
Ports of entry	76	61	56	100	73
Zoonosis	78	69	92	100	85
Food safety	67	80	46	100	73
Chemical	30*	41	39	88	50
Radiological	30*	47	47	100	56
Total score	53	66	60	96	69

Source: PPTA, from MOH and other ministries based on IHR-based Questionnaire. *Expert estimate only

53. While there are substantial country-to-country variations, progress may be summarized as follows: (i) all CLMV countries have surveillance and outbreak response systems for notifiable diseases and any other outbreak, but want to deepen this to include syndromic reporting from village level upward, initiate reporting from the private sector, and improve data management; (ii) laboratory services have been expanded but need better quality, biosafety, standards, and supplies; (iii) cooperation for control of zoonosis (“one health”) is reportedly good; (iv) infection prevention control (IPC), for which WHO has formulated a regional program, has received less attention and funding and much remains to be done to improve hospital hygiene and infectious case management; (v) risk communications have improved, in particular linked to emergencies; (vi) pandemic preparedness remains limited, with no surge capacity in

case of major outbreaks¹²; (vii) regional preparedness, alert, and response (including information exchange) is also inadequate, amongst others due to political sensitivities, and (viii) APSED monitoring needs to be strengthened further, possibly with independent evaluation of progress. WHO has estimated financing gaps in implementing APSED, which are substantial, in particular for laboratory services, emergency capacity and, for unknown reasons the costliest, for community preparedness.

54. In summary, IHR/APSED areas under direct control of CDC/public health departments have improved most, reaching about 80% compliance, while areas involving other countries, ministries, community and departments have done less well, including laboratories and hospitals, community level, and intersectoral and inter-country cooperation. Also marginal communities not accessing health services, in particular ethnic minorities in border areas and migrants in economic zones need to be engaged in EID preparedness and CDC. GMS strategic planning for CDC also needs to be enhanced. IHR capacity building and roll out of APSED strategic areas face a range of challenges as summarized in the next paragraphs. Details are on the countries health analyses.

c. Legislation and Coordination

55. The IHR 2005 of WHO provide a strong and legally binding standard for the control of EIDs and other serious public health threats, such as the spread of drug resistant infections.¹³ WHO's APSED¹⁴ and other WHO regional strategies for disease control and health system development provide a good framework for building GMS health security and major progress has been made. The CLMV governments are fully committed to comply with IHR, and made major progress in implementing APSED. While IHR compliance is due by 2016, CLMV countries have so far achieved about 70% of requirements.¹⁵ With support of the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM), they have also surpassed MDG 6 for the control of infectious diseases and substantially reduced the prevalence of these major debilitating and often fatal diseases.

56. GMS countries have legislation requiring the public to report cases of suspicious infections. If people with a serious infectious disease like SARS, EHF, rabies or cholera delay seeking help, they can cause death of other people. Precious time will be lost to control a potential outbreak at an extremely high cost. Good health services that have the public confidence are therefore essential to achieve public health security. Hence, governments and partners need to ensure that both public health security systems and universal health coverage are in place.

57. The 13th GMS Joint Ministerial Statement held in Vientiane in 2004 reaffirmed the three C's; Connectivity, Competitiveness, Community, of the GMS region. The GMS summit emphasized quicker results on the ground to rapidly reduce poverty; acknowledged the need for even higher level of collaboration; emphasized the role of private sector and development partners; noted that spread of communicable diseases is being addressed through coordinated

¹² Even developed countries like Australia lack a major surge capacity, as was clear during the swine flu outbreak. Also international surge capacity response was quickly exhausted with one major Ebola outbreak. Hence the focus should be on prevention of major outbreaks.

¹³ WHO. 2005. *International Health Regulations*.

¹⁴ WHO WPRO. 2010. *Asia Pacific Strategy for Emerging Diseases*.

¹⁵ WHO. WPRO. 2014. *Asia Pacific Strategy for Emerging Diseases. Progress Report 2014. Securing Regional Health*.

regional response; noted the important role of regional institutions in capacity building; and agreed on a Plan of Action for GMS Program, including HRD sector.

58. The GMS HRD Working Group, identified three objectives for the GMS Health Strategy: (i) strengthened institutional capacity and arrangements for GMS cooperation in health; (ii) enhanced national and provincial CDC collaboration and health care in border areas; and (iii) strengthened regional integration through collaboration for HRD, strengthened regional knowledge management and COP, and regional standard setting.

d. Surveillance and Response

59. **Policy.** CLMV Governments have signed international agreements on IHR and APSED and are highly committed to disease surveillance and response and related IHR/APSED areas. They appreciate assistance from the international community at times of emergencies, which is an essential aspect of surveillance and response for EIDs. China and Thailand already have strong systems in place that extend into the private sector. Reporting of suspicious cases of EID is required by law in China, Myanmar and Thailand. In Cambodia, Laos and Viet Nam this comes under the administrative/political system. It shows the apprehensions governments have about EIDs. All CLMV countries have legislation in place to deal EIDs, although Myanmar legislation will probably need to be adjusted after the transition.

60. All CLMV countries follow basic organizational requirements for outbreaks of diseases including EIDs and other public health events, building IHR core capacities, and rolling out APSED strategic areas. National Focal Points (NFPs) have been established in each of the 4 MOHs. In Cambodia, the Director, Communicable Disease Control Department (CDCD) of MOH is the NFP and responsible for surveillance and response. CDCD is a relatively small unit comprising bureaus of surveillance, prevention and control, and health quarantine. In Laos, the Director, National Center for Laboratory and Epidemiology (NCLE) under the Department of Communicable Diseases Control (DCDC) is responsible for surveillance and response. DCDC is also understaffed. In Myanmar, the Director Central Epidemic Unit (CEU) is the NFP within the Department of Public Health. In Viet Nam, the Director General of the General Department of Preventive Medicine (GDPM) is the NFP along with many other responsibilities and is assisted by the CDC Division including a national surveillance unit, and national and subnational institutions in outbreak investigation and response. It may be concluded that NFPs have many other preoccupations besides outbreak response. NFPs and their teams have essential facilities including a “war room” or emergency operations center¹⁶ except in Myanmar where the general meeting room of the Department of Public Health is being used for that purpose.

61. Legislation for surveillance and response is mostly in place in Cambodia, Laos and Viet Nam. For example, the Viet Nam Law on Infectious Diseases Prevention, effective from 2008, created a strong legal framework for activities against infectious diseases, and was followed by many decisions regulating various aspects of the Law. In Myanmar, the National Disaster Management Law was enacted in 2013 to endorse the role of the multi-sectoral National Disaster Preparedness Central Committee coordinated by the Ministry of Social Welfare, Relief and Resettlement, with a National Disaster Management Working Committee and Subcommittees including for health.¹⁷ It is assumed that this committee also covers epidemics, but may not deal with prevention and early control of outbreaks. The Cambodian National Work

¹⁶ MOH. Decision No. 1424/QD-BYT Establishing the Emergency Operation Center for prevention and control of diseases (EOC). 2013/

¹⁷ Asia Pacific Observatory on Health System and Policy. 2014. Myanmar Health in Transition.

Plan for Emerging Disease and Public Health Emergency to Achieve IHR Core Capacities (2014-2016)¹⁸ and similar plans in other countries identify core capacities for surveillance and response in each country.

62. Concerned departments are performing well coordinating with various ministries, institutions and partners, in particular also with WHO, as reflected in the IHR/APSED assessments. During major epidemics and other major public health events, a broad multi-sectoral support is essential including maintaining law and order, public information, and essential services. Pandemic preparedness plans have been prepared but are insufficiently rolled out. To respond to specific situations of EIDs, multisectoral steering committees have been established, such as in Viet Nam, the National Steering Committee for Prevention and Control of Pandemic Influenza in Humans, and the Steering Committee for Disease Prevention and Control.¹⁹ In each country, different ministries have been assigned responsibilities. However, these steering committees meet infrequently. Leadership has to be provided by the NFPs and their departments. All NFPs in CLMV countries are highly motivated and very active, which is probably one practical reason why there have not been any major outbreaks in recent years except for dengue.

63. Internal coordination, however, faces problems in all CLMV countries, from central level downwards because of the way MOHs are structured, operate, and report. For example, in Viet Nam, health services are fragmented between levels and between preventive and curative care. There is no integration and continuity of care. Current surveillance of communicable diseases is dependent on clinical diagnoses from medical facilities. Some data collected are not passed on. Early detection of cases at the community level are not always been reported. Disease information and reporting system is backward due to lack of infrastructure, equipment, and manpower. There are no national standards for disease surveillance and response. Preventive services are also underused and have unused space. Hence, the government has decided to integrate these services at district level to improve effectiveness and efficiency.

64. Aid coordination is also fragmented, in part because different partners support different subsectors or even surveillance and response systems. In addition, regarding the general surveillance and response system, countries have surveillance systems (and sometimes response) systems for polio, HIV, TB, malaria and a high priority list of notifiable diseases. While partners do communicate, there is no comprehensive program and shared data base of what each partner is doing. This should be provided by the NFPs.

65. Strengthening surveillance and response as part of building IHR core capacities and rolling out APSED is highly dependent on external aid, in particular for emergency response, which is assisted by WHO and ADB. Also the flow of funds is problematic: in case of major emergencies, financial arrangements should kick in to allow a substantive and quick response.

66. Monitoring and evaluation of IHR core capacity and APSED strategic areas is being done through annual multi-stakeholder planning and review meetings and field visits. Core APSED performance indicators are collected, analyzed and completed. IHR questionnaires are completed as part of annual meeting agenda. However, this process is subjective. WHO has proposed to conduct external evaluations. Another issue is that the countries have reached a

¹⁸ National Work plan for Emerging Disease and Public Health Emergency to Achieve IHR Core Capacities (2014-2016)

¹⁹ MOH Viet Nam. *Decision No. 3265/QD-BYT on Strengthening the Steering Committee for Disease Prevention and Control*. 2014. Hanoi.

stage where part of the questionnaires becomes less relevant, and WHO may want to make adjustments at the cost of losing time trends.

67. **Surveillance.** In Cambodia, a surveillance manual was developed in 2004 and the Cambodia Early Warning has been in operation since 2005. During the national surveillance system review in 2008, the disease list was modified to 10 diseases/syndromes. The MOH has also actively engaged with WHO headquarter for the development of a guide for monitoring and evaluating communicable disease surveillance and response systems.²⁰ The web-based CamEWARN was rolled out across country. Indicator Based Surveillance (IBS) weekly reports are available online. Risk assessments were conducted prior to all national investigations in 2015.

68. In Laos, NCLE is managing the surveillance system, EWARN, which is currently limited to syndromic reporting of 17 notifiable diseases. The completeness and accuracy of information need further improvement. According to NCLE, some surveillance systems have been integrated, while program specific surveillance systems such as for EPI are continuing. EWARN is reported from all levels, through multiple channels, among others to identify suspicious cases or outbreaks to be further investigated. Computerization is done from district level upwards and even at district level there are power and connectivity problems. Villages and health centers usually report by hand or text messages. While there are plans to connect 200 health centers with internet, this is mainly in the more accessible south. The main shortcomings are connectivity, computers and software, data entry staff, staff training, field epidemiology scholarships.

69. In Viet Nam, data are generated from multiple sources including immediate reporting of priority diseases, routine reporting of endemic diseases, and sentinel systems. According to the current regulations on reporting of notifiable diseases, each level of preventive health authorities is required to report aggregated morbidity and mortality data on a monthly basis for the 28 notifiable diseases under the surveillance system. Besides, 11 of the conditions including EIDs stipulated by the MOH are required to be reported weekly. All kinds of detected outbreaks of the 28 notifiable diseases or any EIDs have to be reported immediately.²¹

70. Viet Nam has no platform for integration of clinical, prevention, and lab data at any level. All provincial/district preventive medicine units report data by time, locations, and subjects. A high rate of these units make epidemiological maps and the trends of some disease epidemics that occur in the local areas. Many of DHCs miss the deadline of weekly reports, especially with those in the remote areas where internet access and transportation are poor and difficult. There is also a reluctance to report the outbreak to the preventive medicine system because of concerns about performance. This may result in underreporting. Another challenge is that many private health facilities, other sectoral hospitals/health units do not report data on communicable diseases as regulated. Other countries are likely to face similar problems.

71. In Viet Nam, capacity of staff in using IT is good at provincial and district levels, however there is limited software which is not uniform. Many medical staff do not use the software in reporting cases. Equipment and training is needed to improve the use of IT. Cambodia has also quite good computerization down to the district level and plans to expand this to health center level. Some Laos and Myanmar still lack fast internet connection but this is likely to be resolved

²⁰ WHO 2006: Communicable disease surveillance and response systems- Guide to monitoring and evaluating.

²¹ Circular 48 /2010/TT-BYT of Ministry of Health on infectious disease reporting.

soon. Even so, much of reporting in Myanmar is done manually up to state or even central level. In Laos the problem is more of human resource capacity than access to information technology.

72. In all CLMV countries, surveillance systems have improved substantially, to a level that they identify small outbreaks. Many cases in Cambodia are reported using the events-based surveillance, and come in as toll free phone calls. In Viet Nam, evidence of the well-functioning surveillance system was demonstrated with the early detection of H5N1 cases (through SVP reporting), and suspected cases of Ebola and H7N9 (detected through EBS). Lessons learned from recent outbreaks are (i) more efforts should go into improving the use of surveillance data for decision making; (ii) improve case definitions and reporting from curative to preventive systems; and (iii) increase private health sector participation in surveillance/reporting.

73. **Response.** In Laos, vehicles for outbreak response are in place at provincial level but in some provinces vehicles are dilapidated (8 years plus). Road conditions are bad during the rainy season. Protective gear is mostly available, as well as funds for outbreak investigation. The government and WHO provide funds for outbreaks based on reimbursement of expenditures, which is not a satisfactory arrangement for emergencies (ADB funds have been discontinued).

74. In Cambodia, there is a small but well equipped rapid response teams (RRTs) at central level that relies on the support of provincial and operational district RRTs. Vehicles and protective gear are available at provincial level, and can support district teams. Most places are accessible within a day ride during the dry season. The government and WHO provide emergency funds.

75. In Myanmar, MOH also has RRTs, now mainly supported by WHO. WHO has staff at state/region level to assist in surveillance and response. MOH has extensive outbreak response experience and community and religious organizations, the private sector, several partners and NGOs to provide assistance, if needed. However, MOH wants to build up a sustainable capacity for outbreak response, to start with district/township level, by providing vehicles and equipment and training staff.

76. Viet Nam's outbreak response group is led by GDPM, MOH, and includes relevant units within the MOH, and representatives from the Ministry of Agriculture and Rural Development (MARD), WHO, FAO, and USCDC. Viet Nam is also developing a network of laboratories for infectious diseases. The EOC has established RRTs at national, regional, provincial, and district levels to ensure rapid containment of emergency public health events. These RRTs have proven to be very useful. However, the system has some issues and limitations:

- lack of standards on testing, surveillance and prevention of infectious diseases; of quality control standards; and of standard for preventive medicine at the district level;
- some communicable diseases cannot be confirmed at provincial and district hospitals; limited capacity to test for common communicable diseases at provincial preventive medicine centers; district health centers cannot perform confirmative tests as per MOH regulations; and substandard sample tracking and management in laboratory system;
- lack of vehicle at district level (commune health stations use their own motorbike);
- budget restrictions for certain outbreaks.

77. The performance of RRTs probably needs to be improved. One issue is that most of the time, when there are no outbreaks, RRTs should work on reaching MEVs and community

preparedness, but this is not being done, in part because this is not an outbreak but prevention. Also the high cost of RRTs is a concern. Mobile diagnostic services could also be combined with RRTs. On the whole, the potential for RRTs to provide a comprehensive package of prevention, surveillance and response may further improve capacity, equity, efficiency and effectiveness.

78. **Preparedness.** MOH Viet Nam took efforts in planning preparedness for Ebola and disease specific response plans for prioritized diseases, including H7N9, MERS, EVD. MOH developed National Preparedness and Response Plan for Emerging and Dangerous Diseases. In addition to experiences from outbreak control, simulation exercises have been conducted at national and some local levels.

79. MOH Cambodia gained practical experiences following the responses to cholera outbreaks in 1999 and 2009, SARS in 2003, avian influenza A/H5N1 in 2004, pandemic influenza H1N1 in 2009, hand, foot and mouth disease caused by enterovirus EV71 in 2012 and other food borne diseases. An assessment for natural hazards was conducted and a National Strategic Plan on Disaster Risk Management for Health (2015-19) was developed. This plan includes “Proposed Standard Template for Provincial Health Contingency Planning” which was developed in Kratie and Kampong Cham provinces.

80. MOH Laos has also gained experience in outbreak control which helped in pandemic preparedness planning. At a higher level, the government has gained experience with the planning of international events as Laos is opening up. However, the actual pandemic preparedness in Laos is probably low due to staff constraints, infrastructure, and communication problems. Hence Laos may also consider planning for basic scenarios.

81. MOH Myanmar has extensive experience with national disaster including typhoon Nargis. Its National Disaster Preparedness Central Committee is coordinated by the Ministry of Social Welfare, Relief and Resettlement with a National Disaster Management Working Committee and Subcommittees including for health.²² However, this arrangement has not been tested except during recent floods. MOH was provided considerable autonomy to do its part of the relief effort. Simulation exercises would be useful to test the current capacity.

82. In summary, preparedness plans for epidemics and pandemics are in place in all CLMV countries, but at different level of detail and testing through real case scenarios and simulation exercises. The plans include responsibilities of various ministries, regulations and norms (equipment, drugs, biological, and chemicals); logistics, and protocols and SOPs. The UNDP has been having a coordinating role in disaster preparedness including for pandemics.

83. The sad reality is that CLMV countries lack surge capacity to handle infectious cases even for a mild epidemic. For diseases like SARS or Ebola, immediate support from international agencies will be required. In case of a pandemic, it is highly unlikely that the international community will be of much assistance except for diagnoses and producing vaccines. An alternative country pandemic plan relying on self-reliance and sustainability could be considered. In particular the role of the military needs to be planned in detail based on different scenarios.

²² Asia Pacific Observatory on Health Systems and Policy. 2014. Myanmar Health Systems in Transition.

84. **Human Resources Development.** All CLMV countries have realized the importance of competent staff, and have initiated or participated in field epidemiology training programs (FETP). These used to be provided overseas, but are now organized in country in partnership with overseas universities. The aim is to train sufficient FETP graduates to be posted to all provinces/states. At district level, CLMV countries have recognized the need for assistant FETP, and are at various stages of rolling out such a program. One major issue is current lack of facilities for FETP in all four countries. Another issue is financing the program. Some assistance is received from partners, and there is a strong regional FETP network under ASEAN to provide technical support.

85. **Port of Entry.** Port of entry checkpoints are under the authority of other ministries, although ministries of health have varying responsibilities for quarantine services. Quarantine service is difficult as the chance of finding serious infections at border checkpoints is quite small, as evidenced by current data reporting close to zero cases each year. Hence, this does not warrant major investments in quarantine facilities in border areas.²³ Most cases of suspected EID or other serious infection will show up or be identified in the hospitals. However, Viet Nam has decided to add nine border gates including regional quarantine centers, for which funds have been allocated from the state budget.²⁴

86. The general impression is that international airports have fairly good border checkpoint and quarantine services, but not seaports and land border crossing. For example, training for Ebola and MERS was only completed for two airports, not other points of entry in Cambodia. Phnom Penh and Siem Reap airports and Sihanouk Ville seaport were also provided with isolation rooms, medical staff, and a referral system. The usefulness of these investments needs to be shown in time. For the time being, training and equipping quarantine officers to check persons passing through borders may be a priority. If this could be combined with counseling and screening of persons with health problems, this may help in identifying more common infectious diseases such as TB. However, this is a new field that needs further analysis.

87. **Zoonosis.** After the avian influenza outbreak, all CLMV countries have addressed the challenge of control of zoonotic events. This includes legislation, intersectoral coordination, improving surveillance systems, simulation exercises, risk communication, case management, and laboratory diagnoses; and outside the health sector other measures such as licensing, checking of farms, and containing smuggling. However, avian influenza is still circulating in poultry and has caused few human cases. One key issue is information exchange, which does happen regularly. For MOH, it is essential to know if cases have been seen in poultry, to alert the surveillance systems. Other important zoonotic diseases include many viral infections including rabies that do need more attention. Cambodia recently developed a National Strategy for Rabies Control and Elimination.

²³ The Hanoi-based Health Strategy and Policy Institution (HSPI) concluded that health quarantine units currently do not fully meet requirements to detect epidemics and dangerous elements. The reason is that the numbers and types of professional services have not been fully implemented at the gates and at the health quarantine centers/divisions. This is likely due to: (1) poor infrastructure which does not guarantee professional activities (2) shortage of equipment, (3) shortage of personnel in all routes, (4) no official and practical training programs on quarantine, and (5) lack of specific guidance on tasks, coordination and responsibility of each member at the gates. Recently, MOH issued circular No. 46/2014 / TT-BYT on the process of quarantine and circular No. 15/2014 / TT-BYT guiding on health quarantine reports.

²⁴ Mong Cai (Quang Ninh province), Dong Dang (Lang Son province), Lao Cai (Lao Cai province), Cao Bang (Cao Bang province), Cau Treo (Ha Tinh province), Cha Lo (Quang Tri province), Lao Bao (Quang Binh province), Moc Bai (Tay Ninh province) and An Giang (An Giang province).

88. **Food Safety.** Food safety has scored high in the IHR core capacity assessment, in part because the requirements are less demanding. However, outbreaks of diarrheal diseases, dysentery, and other water- or food-borne infections are among the most commonly reported surveillance events, often linked to contaminated sources. These are not of regional importance unless caused by cholera (which is more likely to be water-borne) or other infection that can spread quickly across borders. CLMV countries have had several cholera outbreaks some years back. Another concern is that more pathogenic strains of bacterial causing water- or food-borne infections are emerging. Hence, all outbreaks of food poisoning need to be investigated.

89. CLMV countries still have part of the population lacking safe drinking water and proper sanitation, in particular among remote ethnic minorities. In new urban slums, water and sanitation are also more likely to be problematic. Ministries are in various stages of preparing food safety policy and/or food law, SOPs for foodborne disease outbreaks, training inspectors or public health officers, categorizing restaurants, canteens and food stall by food safety risk, identifying food dangerous additives based on the Codex Alimentarius, and adopting food standards. A major concern is the state of markets, which often have very poor hygiene conditions but are not under the control of MOH. One option is to enhance MOH responsibility and authority for food inspection.

90. **Chemical and Radiological Hazards.** As reported, global agencies have been involved in the appraisal of these hazards, but no substantial assessment has been done in CLMV countries. Responsibilities among ministries are less clear for these events and would, in serious cases, involve the military and other disaster agencies. Some progress has been made since the IHR/APSED evaluation in 2012. For example, in Cambodia, focal points were established in each concerned ministry, for chemical, biological, radiological, and nuclear accidents. A National Workshop on Fundamentals of Nuclear Safeguard. Viet Nam assesses itself in compliance with most IHR requirements for chemical and radiological hazards. Further technical analysis of risks and response capacities would perhaps be the way forward.

91. **Summary.** Appendix 2 summarizes some of the functions, issues and options for surveillance and response and related core capacities. Because issues and options are so much similar among countries (partly because of WHO 's regional strategy and leadership) but at different levels, these are generalized. However, some issues and options will not fit in particular countries. Details are provided in the country health analyses.

92. Surveillance and response received quite a good evaluation, with response being lower as it was combined with IPC. All CLMV countries have disease surveillance systems for instance, weekly or monthly reporting depending on the type of suspected disease. In addition to the national surveillance system there are surveillance systems for particular interests (e.g., ASEAN Disease Surveillance Network, EWARN, MBDS), with their own reporting mechanisms. Data collection may be based on health facility records, hospital sentinel stations, or voluntary event reporting. All countries want to strengthen village-based reporting of diseases, e.g., through syndromic reporting. The current surveillance systems are largely not computerized at district level and below, and are not interlinked with each other and the general health management information system. Effective surveillance systems may need to have nation-wide coverage of public and private providers, facilitate community reporting, have links to other sectors, have response capacity, and be fast. Suspected cases from any part of the country should be reported within half an hour of identification of a suspected case. With modern day mobility and intensity of human interactions, this may become a standard.

93. However, there are evidently gaps in both surveillance and response systems and related areas such as:

- Incomplete legislation and standards
- Aid fragmentation
- Soft IHR/APSED monitoring
- Surveillance systems not reaching to village level
- Lagging IT for surveillance system
- Capacity and efficiency problems of RRTs
- Contingency plans for epidemic preparedness based on various scenarios
- Improving information exchange among ministries, services, levels
- Integration of food safety inspection in CDC including in markets

94. Several areas also warrant further study such as for system integration, role of RRTs, surveillance at ports of entry, chemical and radiological hazards, and pandemic preparedness.

e. Laboratory services

95. Laboratory services are a large subsector that includes both public health and patient care, with apex laboratories supporting complex diagnoses and research, and sometime production of vaccines and medicines, and peripheral laboratory services at provincial, district and community levels.

96. The WHO and member states have produced a Regional Plan for Improving Laboratory Services which serves as a guide for preparing national plans. All CLMV countries have national plans for strengthening laboratory services (Myanmar has a draft plan), backed up by various legislative requirements.

97. Laboratory services have surprisingly strong leadership support, in part because of the existence of long established national institutions: The National Public Health Laboratory in Cambodia, the National Center for Laboratory and Epidemiology in Laos, the National Health Laboratory in Myanmar, and the National Institute of Hygiene and Epidemiology in Viet Nam. Besides, there are several strong research institutions and foundations active in the CLMV with considerable capacity and commitment to assist the government in testing for EIDs and other highly dangerous pathogens, research, training and policy advice. WHO and CDC Atlanta have consistently provided strong support for investigation of suspected EIDs including laboratory diagnoses. Other reference laboratories in Australia, China, France, Japan, Korea, Malaysia, Thailand, United Kingdom and other countries are standby to help in investigation. CLMV countries have a tested transport system in place for sending samples. There is no need to add BSL3 capacity for EIDs in the CLMV countries but perhaps improve transport arrangements within countries.

98. Based on IHR evaluation, laboratory services scored quite high at 74%, with Viet Nam 100%. This high score is partly due to the type of compliance questions being asked, which do not refer to actual implementation. However, with strong national commitment of governments and partners, laboratory services are improving steadily but slowly. The major challenge now is to improve the overall network of peripheral laboratory services and link this better to clinical diagnoses and surveillance systems, marginalized communities, and livestock and food safety subsectors.

99. Laboratory services were appraised in terms of governance, biosafety, quality, linkages, and access. Basic requirements are as follows: (i) national commitment, which is evident except in recurrent cost financing. (ii) laboratory services do no harm because of poor facilities and biosafety procedures. Only top laboratories meet this requirement. (iii) the results of laboratory testing should be reliable and accurate, requiring qualified staff, calibration, SOPs, a clean environment, etc. (iv) laboratories' results should be properly used by medical and surveillance staff who understand the meaning of the tests and know what tests to ask for. This area also needs a lot of improvement. (v) laboratory services should be upgraded and expanded to reach all those in need with essential tests. While this has been in many cases the first priority, in particular by supplying more equipment but not staff, it should only be considered if other requirements are in place.

100. One reason for slow progress is that laboratory services are complex and require high standards to deliver results. Multiple functions need to come together to provide good diagnoses including legislation, accreditation, planning and financing, aid coordination, management and monitoring, supplies, equipment maintenance and calibration, facility maintenance and biosafety, pre-graduate training, in-service training, quality assurance, audit, linkages with other services, and upgrading services and improving access. Drivers of improving laboratory services are sustained technical leadership, staff competency, and financing of facilities and supplies. These are priority areas to be addressed.

101. Appendix 3 provides a summary of laboratory functions, issues and options. Functions overlap and the listing of a function in one area does not exclude it from other areas. For example, it is assumed that training and audit also address biosafety. Some of the issues and options may be less relevant for a CLMV country. Country specifics are in laboratory assessment reports.

102. **Summary.** CLMV countries have built up a modest network of laboratory services but two major concerns are insufficient laboratory biosafety and quality, which can cause misdiagnosis and be of potential harm to the patient and others. CLMV countries typically have laboratory policies in place, but need to rationalize in expanding services due to limited staff capacity, and need to put subsystems in place for improving laboratory quality and biosafety, including in standard setting, staff training, external quality assurance and audit. Past investment in laboratory services has upgraded and equipped laboratories. With support of WHO and other partners, national and the larger provincial hospitals are being improved. In smaller laboratories, maintenance and testing may be performed without any reference to standard operating procedures. There are also several biosafety issues including for laboratory waste disposal. Staff capacity is a major issue in these laboratories. The undergraduate training of medical laboratory staff is chronically under-resourced. In-service training in the workplace is ad hoc and the effect not evaluated. There is no formal process for internal and external quality assurance and for auditing of diagnostic laboratories for compliance with quality and safety guidelines. CDC 2 provided key equipment to a number of provincial laboratories to enable them to undertake communicable disease diagnostic activities safely and reliably. It is important to provide the "soft" items that will enable fuller use of these earlier investments in equipment. Separate laboratory analysis reports have been prepared for the four countries.

f. Infection Prevention and Control

103. WHO's bi-regional strategy for IPC is being rolled out in the GMS, and addresses one core capacity of IHR that is underperforming (under "response"). The aim is to make all health facilities hygienic places that can handle infectious patients properly without risk of spreading

infections or grooming drug resistance. Because of many years of under investment in infection control including human resources and recurrent budget for maintenance and supplies, most hospitals are far from meeting IPC standards. This is summarized in the country health analyses. While there are different levels of progress in the CLMV countries, similar problems can be encountered in all countries.

104. The World Alliance for Patient Safety was launched in October 2004 to facilitate the development of patient safety policy and practice in all WHO member states and to act as a major force for improvement. In October 2005, the Alliance launched the first Global Patient Safety Challenge with the theme 'Clean Care is Safer Care', to bring together the WHO Guidelines on hand hygiene in healthcare with ongoing work on blood safety, injection and immunization safety, safer clinical practices, and safe water, sanitation and healthcare waste management. It emphasizes that hand hygiene is the primary measure to reduce healthcare-associated infection, which is a major area of concern in patient safety, and the spread of antimicrobial resistance.²⁵

105. In a recent attempt to show the scope of the problem of patient safety, Mugrditchian and Khanum (2006) showed that Thai and Indonesian situations are similar to those in industrialized nations where it has been estimated that 10% of hospitalized patients suffer an adverse event and 5–10% acquire a healthcare associated infection.²⁶ They cautioned that the Thai and Indonesian findings should not be extrapolated to other countries in the region. They observed that the incidence of adverse events is likely to be significantly higher in hospitals and in countries where services and accreditation programmes are less well developed. They showed evidences that when compared to industrialized countries, the risk of acquiring a healthcare associated infection is estimated to be 5–20 times higher in developing countries and 3–20 times higher for neonates.

106. **General IPC.** The IPC program has to address a large number of problems as listed in Table 8, requiring considerable investment in facilities, equipment, supplies, scholarships and training, and central and hospital management. This cannot be all done at once given limited resources and capacity. Infection control centers around *behavior* or health care providers, patients and family and is culturally ingrained and difficult to change but could even be improved with limited funds. It requires strict enforcement of hospital rules based on IPC guidelines and SOPs; adequate linen and supplies; sterilization and laundry equipment, and basic repair of facilities for handwashing, sanitation and waste management. Larger hospitals should be provided with isolation rooms.

Table 8: IPC Areas and Problems

IPC areas	Problems
Health facilities	Poor maintenance, leakages, broken and non-functioning toilets and washbasins Broken waste water management and drainage facilities Poor solid waste management including poor waste separation and storage, broken incinerator, waste dumping in hospital compound No proper isolation rooms in larger hospitals

²⁵ Donaldson, L. (2005). Patient Safety: "Do No Harm", in: Perspectives in Health, The magazine of the Pan American Health Organization. (<http://www.paho.org/English/DD/PIN/Number21>)

²⁶ Mugrditchian, SD., Khanum, S., 2006. "Placing patient safety at the heart of quality in health care in south-east asia". International Hospital Federation Reference Book 2006/2007 021. <http://www.ihf-fih.org/pdf/21-24.pdf>

Equipment and supplies	Broken hospital and laboratory equipment for sterilizing infected material and cleaning linen Shortage of sanitary supplies for wards, staff, and patients Old personal protective gear for highly infectious patients
Laboratory	No microbiology surveillance to monitor infection and drug resistance Bio cabinets maintained
Human resources	No senior nurse as focal point fully qualified in IPC Lack of trained staff in IPC Infection control committees not active
Hospital staff behavior	Handling of sharps and other waste Handwashing and proper uniform Attention to hygiene and coughing of patients
Patients and public behavior	Unhygienic clothes and habits Overcrowding of larger hospitals Difficulty to control patient relatives Mixing of patients
Management	No full time dedicated central team and active program management Lack of substantial funding for IPC Hospital management not interested in IPC Lack of guidelines and SOPs such as for antibiotic use, hygiene, waste disposal Lack of accreditation enforcement Weak IPC monitoring

Source: WHO country offices, provincial/state hospitals

107. Countries have started to roll out IPC from the top, with WHO support for training of a core group and developing a country strategy and plan, which has been done in all countries. IPC roll out has been initiated in central and provincial or state/region hospitals. Infection control committees and focal points have been nominated in these facilities, and some scholarships for IPC specialists and training has been provided. Standards and guidelines have been prepared. However, even in these large hospitals, there is insufficient effort to change provider and patient behavior, such as handwashing, which on its own is known to be a highly cost-effective intervention. Also, no substantial funds have been made available to purchase key IPC facilities and repair facilities except through a World Bank project in Viet Nam.

108. Cambodia MOH has approved the National Infection Control Policy and National Strategic Plan,²⁷ and has rolled out IPC in central and provincial hospitals with the establishment of IPC committees and focal points and a scholarship and training program with support of Japan and USAID. It plans to expand IPC to operational district level and to health center level, and recommends the policy to be followed by the five other ministries running their own health services.

109. Laos MOH prepared a strategy in 2013 to roll out IPC. The initial target was national and provincial hospitals. The next phase is to improve IPC in district hospitals. About 25 persons have been provided IPC scholarships. The six Bachelors of Arts and one Masters of Science in infection control are all in Vientiane. Post-graduate or BA training in infection control at the University of Health Sciences is being considered. Some 300 persons have also been provided short training in infection control, including case management of EID.

110. Myanmar MOH has a long tradition of IPC dating back from colonial days. With support of WHO, it has prepared a strategy and plan to roll out IPC in public facilities. Following the

²⁷ MOH Cambodia. National Infection Control Policy; December 2009

Private Medical Facilities act promulgated in 2007, licensing has been provided to 151 private hospitals and 521 specialist clinics. These hospitals and clinics are being inspected and also participate in the voluntary quality improvement programs of the Medical Association Myanmar. This includes measures for containing infection control and drug resistance.

111. Viet Nam MOH has approved multiple legal documents for IPC and drug resistance.²⁸ About 80% of officers in charge of wards and outpatient departments have been trained. However, only about 20% of other health staff has received training in IPC. Conditions of hospitals and health centers vary, as do hygiene standards. Setting up an IPC monitoring system or preferably integrating this with HMIS would help improve hygiene standards.

112. Infection control in markets, even in capital cities, is very poor and a threat to public health. These markets are typically managed by local governments. However, MOH has a public health responsibility to ensure that hygiene in markets is maintained.

113. **EID Case Management.** Hospitals are the most likely recipients of patients with an EID, and also pose a major concern as a focus for the spread of these diseases as was the case of MERS in Korea. In addition, health facilities are a source of nosocomial infections and developing drug resistance. Current IPC practices in health facilities are substandard. Prevention of the spread of local outbreaks is essential as no country in the world has large surge capacity for EID.

114. Cambodia has about 30 designated quarantine beds and 1500 TB beds in Phnom Penh and larger provincial hospitals, which can be used to manage a surge in EIDs. Laos has about 30 beds nationwide, 15 in Vientiane (10 in Friendship hospital), others in larger provincial hospitals, that can be commandeered for quarantine. In Viet Nam, 80% of 150-bed-hospitals have an IPC ward. Some GMS facilities were upgraded during SARS but most lack equipment and safety features. The main purpose is to isolate suspected cases for further investigation. Transport of suspected cases has also been prepared and simulation exercises are conducted yearly.

115. In addition to WHO for technical support and the World Bank support for facilities in Viet Nam, several partners provide support for training and scholarships. Specifically, for EIDs, designated staff are trained to identify potential EID cases among both OPD and IP patients. Protective gear, supplies and equipment including for waste disposal, such as autoclaves and incinerators, are often lacking. Laboratory biosafety and bacteriology needs to be improved to test for drug resistance and nosocomial infections. Jointly with WHO, an infection control monitoring system is being set up. Accreditation of health facilities will also be subject to meeting infection control standards. There is a strong health security case for IPC support. Among the priorities for case management of EIDs are repair of facilities and provision of equipment.

g. CDC in Border Areas

116. There are three issues under this heading, the first being CDC in border areas, the

²⁸ MOH Viet Nam. Circular No. 18/2009/TT-BYT 2009 Guidelines for organizing the implementation of infection control in health facilities; Decision No. 2174/QD-BYT 2013 National Action Plan for combating drug resistance in the period 2013-2020; Decision No. 3671/QD-BYT 2012 technical guidelines on infection control; Decision No. 1014/QD-BYT 2012 National Action Plan on strengthening infection control in health care facilities between 2012 and 2015.

second being cross-border services, and the third being using borders for CDC screening.

117. **CDC in Border Areas.** Border areas in CLMV countries are a contrasting mix of forested highlands with isolated ethnic minorities; and strategic valleys or lowland with busy borders towns and sometimes industrial zones and casinos along economic corridors. Every day, many local people cross borders for work, in addition to busses, trucks, tourists, and visitors of casinos. MEVs often have less access to CDC and may not use CDC programs for a variety of reasons. For isolated ethnic minorities reasons include customs, access, and poverty. For migrants working in border towns it may be migrant status, language problem, work conditions and costs with access to local drug shops. For example, in Laos and Cambodia there are Chinese and Vietnamese doctors treating their own country citizens.

118. The disease burden of migrant, mobile people, youth, pregnant women and poor ethnic groups in border areas will vary by occupation and location. There are special concerns for cross-border migrant workers returning home with HIV or TB, who have limited access to regular health services. HIV positive youth and pregnant mothers also have less access to these services. Major disease control programs are in place for HIV/AIDS, TB and malaria, in particular for HMT. However, these programs often do not reach these groups in border areas, due to staff and funding constraints. Only in Myanmar, NGOs play a major role in reaching these groups where government systems are failing. Despite major financial support of the Global Fund for HMT, funds are lacking to identify up to about one third of infected cases, and also treat up to about one third of diagnosed TB and HIV cases in some countries.

119. **Cross-border services.** A cross-border survey undertaken in the first GMS CDC project found that about half of all provinces in Cambodia, Laos and Viet Nam was engaged in cross-border activities, about half of which was financed by government, and the other half receiving some form of foreign aid. Cross-border activities were limited to few meetings every year and rarely joint disease control. Other issues discussed were patients seeking health care across border and how to finance this, including emergency services. There has been discussion on developing a health insurance system for cross-border patients but this is difficult to realize as, with subsidy, more patients will bypass local services. The Kenan Institute and MBDS program have worked on developing cross-border cooperation in the GMS.

120. China has had bilateral agreements in place with Myanmar, Laos and Viet Nam for cross-border control activities of HIV/AIDS, TB, and malaria. Thailand also has sponsored cross border activities with Myanmar, Cambodia and Laos. These are examples of effective collaboration. Dengue is a priority for such support. EIDs are usually handled at national level.

121. **Border screening for CDC.** The International Office of Migration has been piloting TB screening programs for international and cross-border migrants. The practical notion is that there are only few ports of entry where large number of people flock together to cross the border, after which they disperse again and are hard to track. Only for international travel at port of entry, a health form may be filled up, a contact number obtained and thermo scan done, but this is usually not done at land or sea port of entries. Offering people with health problems voluntary screening facilities at border may identify new cases of infectious diseases. They could be offered treatment and screening of family members. Border hospitals could be part of this, where it is more likely to find EID cases rather than in border posts.

122. **In summary,** improving CDC in border areas, cross-border cooperation, and border screening will contribute to regional public health security and therefore UHC. However, border areas have had less attention, or may not get the funding in line with their much increased

population and burden of diseases. Governments should seriously plan how to address health services in border areas, including reaching remote ethnic groups, and reaching people in labor camps and high risk workplaces. Governments should seriously consider engaging NGOs in reaching these groups that are not hampered by the constraints of standardized government norms.

h. Regional Cooperation

123. To implement IHR and deal with other diseases of global importance, APSED gives importance to global, regional and cross-border cooperation (to this may be added cooperation among provinces in the same country). WHO leads the public health security agenda at global and regional levels and works closely with governments at national and sometimes subnational levels. As discussed above, many other agencies are active at various levels.

124. **Infection control.** The main rationale for regional cooperation in public health security, unlike in other areas, is that infections can easily spread across borders. This requires timely exchange of information on suspected cases of notifiable and other highly contagious diseases and sometimes cooperation for timely outbreak control. The level of information exchange needs to be based on epidemiology in terms of benefits and costs of such cooperation. While this is difficult to evaluate, the view of experts is that insufficient efforts are made by national governments for such cooperation. The main reason is not technical but political. Governments are reluctant to share sensitive information. Formal information exchange still passes via WHO which takes time.

125. With support of earlier projects, progress has been made with informal information exchange among national CDC units and among cross-border provincial governments with support of local governors. This dialogue is mostly ad-hoc based on some problem and lacks follow-up. Following several meetings, governments have agreed on formulating guidelines and standard operating procedures (SOPs) but progress has been slow.

126. **Knowledge management.** A second important purpose of regional cooperation is to learn from one another. In earlier projects, the regional workshops and technical forums proved very useful. Setting up community of practice (COP) and other knowledge management systems was however hard to sustain as this requires champions who can devote time running these KM activities. Importantly, future KM activities should be geared towards GMS/ASEAN/APEC standards and development of evidence based strategies.

127. **Team building.** A third important reason for regional cooperation is to build a regional community of officials and experts that trust and motivate each other. Regional and cross-border activities have helped to establish quite a good network among ministries, provinces and experts, but this would also benefit from making it more formal.

128. **Leverage and efficiency.** Working together can benefit in terms of leverage to get more support, and economy of scale by working together in developing control strategies, in disease control, and potentially also in joint negotiations for purchase of products. Regional cooperation did create leverage with partners and regional projects but could do much more in terms of working together for greater efficiency. Several regional studies have helped in developing control strategies. Joint procurement is already done through UNOPS. However, a bigger hurdle will be procurement rules of governments and partners.

129. Apart from political sensitivities, regional and cross-border cooperation was also challenging due to (i) officers being busy with national priorities; (ii) flow of funds problems; and (iii) differences among health systems. Language is no longer considered an issue.

130. To guide GMS subregional cooperation, a regional steering committee was established some 12 years ago, with the host GMS country sharing this. While it is performing satisfactorily, it may consider integration with other regional initiatives. A regional cooperation unit based in MOH, Laos, serves as the secretariat of the regional steering committee and is, among others, focusing on administering workshops and forums, sharing technical information, and facilitating information exchange and cross-border cooperation among countries.

131. GMS CDC projects were able to provide bridge funding through a regional pool mechanism managed by the regional coordination unit (RCU), but this has been discontinued. Alternative mechanisms for supporting and institutionalizing regional and cross-border cooperation need to be identified, e.g., with technical assistance bridge financing.

132. In summary, infectious diseases do not respect borders, and need regional and cross-border cooperation for their control. For example, migrants returning with HIV or TB need continuity of treatment, to avoid complications and drug resistance. This requires regional health financing systems to be in place for migrants. Similarly, control of EIDs requires quick regional and global coordination involving law enforcement and many other groups; and the control of cholera, malaria or dengue requires cross-border collaboration. Regional collaboration also has other benefits such as technology transfer and human resource development, economies of scale, and leverage for fund raising. Sharing of CDC progress and issues among ministries also stimulates performance and accountability.

133. Regional coordination should be fully government-owned and institutionalized including office, staff and operations paid by the government. Cross-border cooperation is gaining momentum but needs to be integrated into routine CDC. National aid coordination mechanisms for public health security are in place but coordination needs to be improved, and public health security needs to be mainstreamed and funded in sector plans.

134. More permanent solutions for the regional steering committee and RCU need to be identified. Governments need to consider whether they want to maintain such as regional steering committee and secretariat, and how it can be financed. Government cannot pool funds with other countries or easily finance offices abroad. One option is simply to divide the regional work, with the host country financing the office and local support staff. Another option is merger with MBDS.

V. DISEASE CONTROL PROGRAMS

a. HIV/AIDS

135. CLMV countries are also merging in terms of HIV/AIDS epidemic. After the first GMS case in Myanmar in 1986, the epidemic quickly spread in Cambodia and Thailand, reaching an HIV prevalence of up to 2% of the adult population. HIV typically spreads from high risk groups like injecting drug users to sex workers to sex clients and their spouses, but it is now felt that injecting drug users, a marginalized group, may have had less of a role in spreading the epidemic, even though the HIV prevalence in this group continues to be the highest. The spread

of HIV was likely facilitated because a large part of the adult population had multiple partners without protection.²⁹

136. In line with UNAIDS strategy, countries adopted a comprehensive HIV/AIDS control program including public education, 100% condom distribution, voluntary counseling and testing, and continuum of care. As multiple aid organization and NGOs engaged in HIV/AIDS control, the UN urged governments and partners to adopt one HIV/AIDS action framework, one national coordinating authority, and one monitoring and evaluation system.

137. In Cambodia, the HIV prevalence was halved from its peak of 1.7% to 0.8% by 2011 and is now estimated at 0.6%. Myanmar and Viet Nam (as well as China) have concentrated epidemics in high risk ethnic minority populations along the borders with China and around cities. These are linked to both commercial sex and injecting drug use, including amphetamines among youth. In 2014, Myanmar's HIV prevalence in the age group 15-49 years and above was 0.54%; in FSWs 6.3%, in MSM 6.2%, and in IUDs 23.1%. There may be 212,000 people living with HIV in Myanmar, and 11,000 died of AIDS in 2014.³⁰ The Viet Nam HIV prevalence in the age group 15-49 years is estimated at 0.4%, and about a quarter million people are living with HIV. Lao's HIV epidemic started late and has stabilized at 0.3% with 800 new cases per year, but may increase due to increased migration, higher income, better connectivity, and lifestyle changes.³¹

138. The HIV/AIDS control programs in Cambodia and Thailand are considered highly successful. The dramatic reversal of the HIV epidemic in Cambodia, Myanmar, Thailand and Viet Nam was achieved through very strong political commitment, highly competent leadership, appropriate strategic planning, sound management, broad stakeholder partnerships, and effective implementation based on standardized operating procedures. Such a remarkable combination of competencies was supported with strong technical support and funding from development partners. The highly visible epidemic affecting upper and middle class persons probably also incited changes in public behavior. Cambodia, in recognition of its achievements in HIV control, received a 2010 United Nations MDG award.

139. One major challenge for HIV patients is continuity of care, because it is a life long treatment. In particular for migrants working abroad and starting treatment abroad, travel costs are high. For example, in Laos, there are only nine provinces with an HIV/AIDS treatment center. Many workers returning from abroad leave the country every three months to obtain treatment. Another reason for this is concern about stigmatization in their home country. A third problem, the emergence of drug resistance to HIV, is linked to irregular use of medicines.

140. Currently, countries support the global efforts to eliminate HIV/AIDS, based on the Three Zero's approach, aiming for zero new infections, zero stigma and discrimination, and zero deaths by 2020. This also implies that all HIV positive patients should have access to treatment. However, current funding of the HIV/AIDS control program in all CLMV countries is inadequate to cover all HIV patients with the new early treatment policy. It is estimated that about 30%-60% of people needing HIV treatment go without it in the CLMV countries. That also means that they can infect others. Lao's HIV/AIDS program has been chronically underfunded, in part because HIV/AIDS is not considered a priority problem, leaving 12 provinces, in particular in the north,

²⁹ The risk of HIV transmission through unprotected sex from an HIV infected person is estimated at about 1%, but with concomitant STI infection, transmission risk is higher. STIs are a major public health problem in the GMS.

³⁰ UNAIDS. *Myanmar Global AIDS Response Progress Report (for 2014)*. 2015

³¹ The data are compiled from reports of MOH, UNAIDS, and World Bank.

without major HIV/AIDS prevention. A Thailand World Bank study has clearly demonstrated the substantial savings achieved with HIV prevention instead of treatment.

141. The HIV/AIDS control program is very costly, and has received major support from the Global Fund and also from USAID and other agencies. Some of the partners have pulled out or are planning to pull out because of the economic status of the countries, leaving a major financing gap which governments have started to pick up. The Cambodia HIV program requires \$30 million per year, including \$10 million for ARV and opportunistic infections (OI) drugs per year. The Global Fund support for the Lao HIV Program, which is most of the budget, will decline from \$14 million for 2014-2015 to \$9 million for 2016-2017. At 40% treatment coverage, Myanmar's HIV/AIDS program reached \$53.5 million in 2014, which is not sustainable if donors pull out. USAID pulled out its major contribution to the HIV/AIDS control program in Viet Nam.

142. In summary, the HIV/AIDS programs in the CLMV countries have been very successful with major support of the Global Fund. Major concerns are a resurgence of HIV due to changing lifestyle, insufficient case detection in particular among women, lack of access to treatment for marginalized groups (and in Laos entire provinces), complications of HIV treatment due to drug resistance, and insufficient funding to treat all identified HIV positive patients. Governments are committed to increase resources for HIV programs, but it is doubtful that this will meet budgets.

b. Tuberculosis

143. Tuberculosis is a disease that builds up in populations exposed to bad living conditions, such as in war or institutionalization, malnutrition, and lack of access to TB services. In the GMS, it is common among the poor, isolated, elderly and sick, including those with HIV/AIDS. The main control strategy is actually treatment of infective persons, in addition to supportive measures such as housing, nutrition and vaccination.³² After active or passive case-finding and hospital diagnoses, the patients usually access the TB control program to receive the Direct Observed Treatment-Short course (DOTS), delivered as closely to the patient as possible, such as the health center or even at community level. The purpose is to ensure high patient compliance with treatment and high cure rate, in particular to avoid development of multi-drug resistant TB (MDRTB).

144. CLMV countries have had very high TB prevalence rates and are still in the global list of countries with a large burden of TB. Cambodia's TB prevalence rate reduced from 1,634/100,000 to 817/100,000 between 1990 and 2011.³³ In total, there are about 150,000 TB patients. Of the estimated 60,000 new cases each year, about two thirds are detected and half are infective. The treatment compliance is reported at 85%. In Myanmar, WHO estimated a TB prevalence of 473/100,000 in 2013, with about 230,000 new TB patients that year. About 62% of these new TB patients were identified, of which 30% were smear-positive. That means that just over half of new TB patients is identified and properly treated in Myanmar. In Laos, the TB prevalence is estimated at 540/100,000, or about 35,000 infected persons. About 5,900 new TB cases are expected in 2016, of which 70% may test positive. About one third of confirmed TB patients receive treatment.

145. National TB programs have close to 100% coverage and are decentralized to the health center, so physical access is not a major issue. The major problem of TB programs is lack of

³² BCG vaccination is reportedly less effective in preventing TB infection but may help reduce the severity of TB. New TB vaccines are being developed.

³³ The Cambodia National TB program estimated the TB prevalence at about 650/100,000 in 2009.

treatment capacity, primarily due to lack of funds. Many TB patients are not identified and continue spreading the disease, and potentially also MDRTB. These include people not making use of public health services such as isolated ethnic groups and migrant workers in labor camps. Deployment of GeneXpert and digital X-ray machines in district hospitals and mobile clinics will increase case detection among high risk groups, but this requires that identified people can be included in the treatment program. Also migrant workers who start TB treatment abroad often do not have access to treatment on return to their home country.

146. For the treatment itself, challenges are, first, that patients with HIV are vulnerable to TB and opportunistic infections. The prevalence of HIV in TB patient is 6.3% in Cambodia and 9.2% in Myanmar. Second, TB drug resistance is common in CLMV countries. In Cambodia, in 2006, the prevalence of MDRTB among new smear-positive TB cases was 1.4 % and among retreatment cases was 10%. In Laos, about 5% of TB patients have MDRTB. MDRTB treatment costs about \$1,400 per person compared to ordinary DOTS treatment costing \$25 per person. MDRTB treatment requires admission in specialized hospitals of which there are few.

147. While TB has a much higher burden of disease and mortality than malaria and HIV/AIDS, its control received much less funding. In Myanmar, the 3D fund, financed half of all HIV/AIDS, malaria and TB control in the country for several years, but allocated only 13% of its budget to TB control. HIV/AIDS and malaria are simply drawing more attention. The Global Fund is now moving back into TB control in Myanmar.³⁴ In Laos, the 2-year GF grant for TB control of \$7,852,309 ended in June 2015, and a new 2-year grant of \$7 million started in July 2015. The GF supports first line treatment in all provinces for about \$200,000 per year, and \$100,000 per year for MDRTB. In Cambodia, the current TB budget is \$30 million per year, including \$5 million from the Global Fund, \$3-4 million from USAID, and \$1.5-2 million from WHO. For 2014-2017, there is a funding gap of 30-50%, and this is higher for 2018-2020. Current gaps are reportedly in drug procurement, active case finding, mobile clinics, and isolation wards. For migrants, access to treatment when working or returning from abroad also needs to be improved.

148. In summary, CLMV countries have made remarkable progress in TB control, with support of the WHO DOTS program and GF financing (and 3D financing in Myanmar). The program has been decentralized with almost 100% coverage and good diagnostic capacity, but about 30% of new TB cases each year are still being missed, requiring improvement of case finding. To realize ambitious goals will require scaling up case finding and treatment of routine TB and MDRTB, which will require a substantial increase in TB funding.

c. Malaria

149. The CLMV countries have a climate and ecology that is suitable for the transmission of malaria, and malaria has been the number one public health problem for many years (and offered protection of local inhabitants against invasions). Malaria started to decline with the widespread use of insecticides and antimalarial drugs, most malaria is now found among people living and working in the forested highlands of GMS countries.³⁵ Widespread use of insecticide treated bed nets (ITB), better diagnoses and treatment, and various forms of vector control have reduced the malaria burden. Development of a malaria vaccine has proved to be very difficult.

³⁴ In Myanmar, the 3D fund financed TB control but has now moved to MNCH with the GF taking over HTM diseases.

³⁵ *Plasmodium falciparum* infections are declining relative to *Plasmodium Vivax* infections. While *P. Vivax* infections have lower case fatality rate, the infection may need special treatment and may recur after many year.

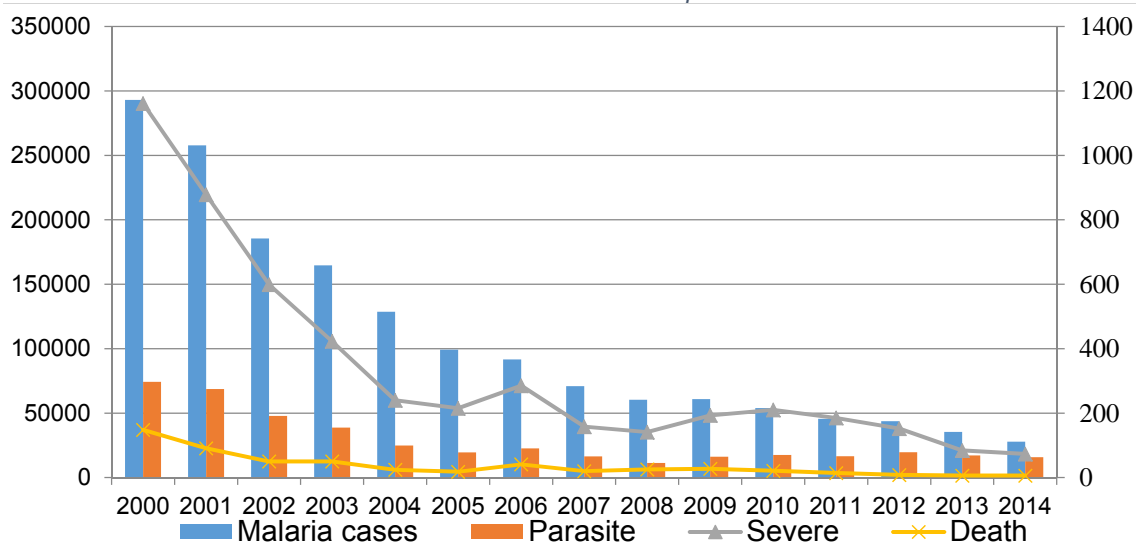
150. Myanmar has by far the highest burden of malaria. The annual malaria morbidity rate reduced 4-fold from about 25/1,000 cases in 1990, to 6.4/1,000 cases in 2013. The Integrated Household Living Conditions Survey 2009-2010 found that only 11.1% of children below the age of 5 slept under insecticide treated bed nets. Current use of bed nets is likely close to 50%.

151. According to Institute Pasteur du Cambodge, the average malaria incidence in Cambodia is about 4 cases per 1,000 population, with a total of 100 deaths per year. However, the incidence is much higher in the north-eastern provinces, which have forested highlands. Malaria became a major problem among the migrants who have moved into these less populated provinces.

152. Similarly, in Laos, malaria has substantially reduced but is still a public health problem in the southern provinces, mainly with mobile forest workers. A rebound of malaria occurred in Attapeu province in 2012 following a major deforestation and plantation project.

153. Malaria in Viet Nam was mostly associated with people moving in and out of the forest. Viet Nam had a rebound of malaria following major resettlement of non-immune people from the red river delta to the central highlands, to the point that every family was issued a drug kit. Since then, the malaria incidence has dramatically reduced, as illustrated in Chart 1.

Chart 1: The situation of malaria in the period 2000-2014



Source: NIMPE

154. WHO and GMS countries are aiming for malaria elimination or intensified control depending on the area, and have formulated country plans to achieve this. The most compelling reason for having such an ambitious goal is that the GMS is the epicenter of artemisinin resistant malaria. The malaria epidemiology in border areas is complex, and is related to migrants; mixing of partly immune and non-immune people; exposure in forests, plantations, settlements, and refugee camps;³⁶ and mobility of infected persons. Large numbers of anopheles can become infected before people seek treatment. Besides Artemisinin-based

³⁶ Bhumiratana, Adisak, et al. Border Area Malaria Associated with multi-drug Resistance on Thailand-Myanmar and Thailand-Cambodia Borders: Transmission Dynamic, vulnerability, and Surveillance. Mahidol University. 2013

combination therapy, chloroquine and fake medicines are commonly used. Most Artemisinin resistance is found at the Cambodia-Thai border (Pailin Chantanaburi) and at the Myanmar Thai border (Kayin Tak). Other places of concern are Dak Nong and Binh Phuoc in Viet Nam, and Bago and Thanintharyi in Myanmar.

155. To deal with drug resistant malaria in Asia, WHO is leading an Asia Pacific effort for malaria elimination in Asia by 2030 – no malaria, no resistance. The Global Fund is the major financier of malaria control, in particular for supply of bed nets,³⁷ case detection, treatment, and general support in hotspots. The GF does not support mobile clinics for MEVs, vivax control, supply chain, and participation of private clinics. Future GF support for malaria may be scale down.

156. The Asia-Pacific Leaders Malaria Alliance, established at the East Asia Summit in 2012, is a high level governments and partner's forum co-chaired by the President of Viet Nam and the Prime Minister of Australia to generate political commitment, financing and cooperation for malaria elimination in Asia Pacific. ADB is the secretariat for APLMA. ADB is also managing the Regional Malaria and Other Communicable Disease Threats Trust Fund, funded by the Governments of Australia and the United Kingdom, to finance malaria projects in Asia Pacific, to be closed in 2017. Future plans for APLMA and the fund are under discussion.

157. In summary, the high malaria burden in Myanmar and in pockets in forested areas with mobile people and settlers in other countries has reduced substantially. Governments have rolled out comprehensive malaria control programs with support of the Global Fund, the 3D Fund in Myanmar, and other partners. This included distribution of free bed nets, case finding, treatment and vector control. Malaria control remains a high priority of CLMV Governments and partners. While malaria elimination is in sight, the main concern is that emerging drug resistance, only confirmed in few border areas to date, will spread to Africa with major consequences. The funding required for malaria control in the GMS is substantial and being discussed.

d. Dengue

158. According to WHO, dengue fever (formerly called dengue and dengue hemorrhagic fever) is the world's fastest growing vector-borne disease. Epidemics occur every few years and have become progressively larger. Unlike for most other diseases, sequential infection with the four different serotypes increases the risk of severe illness. Dengue is transmitted by an *Aedes* mosquito,³⁸ mainly active during dusk and dawn. Expansion of urban low income habitats, economic corridors and increased travel are likely to facilitate the spread into rural areas. At the same time, control efforts in urban areas are complex due to lack of access to larvae breeding sites. The role of climate change is unclear.

159. Surveillance and response are critical in dengue control, in particular when using rapid tests allowing early identification of cases and a quick response. Insecticide fogging and community clean-up campaigns of vector breeding sites are used during outbreaks. Community education has only had a transient and limited effect. Even Singapore has regular outbreaks of dengue (and now also Zika virus). Curative treatment for this viral disease is supportive but important to reduce the case fatality rate (CFR).

³⁷ Long lasting impregnated bed nets supplied by GF cost \$2.30 each. Social marketing of bed nets is not encouraged nor offered by suppliers.

³⁸ This is caused by the same mosquito causes an outbreak of Zika virus in South America and Southeast Asia.

160. The GMS has seen a rapid increase in dengue since the 1990th, starting from Thailand. Myanmar's dengue prevalence has increased significantly, to roughly 200,000 cases per year and 1,000 deaths, and is spreading from urban to rural areas. During a visit to the Mon state hospital in summer, two thirds of the overcrowded children ward was occupied by dengue victims. In Cambodia, 7,241 cases (331 deaths) in 1990 and 10,208 cases (424 deaths) in 1995 were reported. The worst year for dengue on record in Cambodia was 2007, when 39,851 cases with 407 deaths were reported (CFR = 1.03%). Dengue is also a major public health problem in Laos, in particular in Champasack and Saravane provinces. A major outbreak in 2015 coincided with the end of the ADB CDC2 project supporting dengue control. In Viet Nam, over 100,000 cases were reported annually before the start of the National Target Program (NTP) in 2010. In 2014, only 31,848 cases and 20 deaths were reported but in the first nine months of 2015, this had increased to 43,141 cases and 28 deaths.

161. Countries have adopted the WHO Global Strategy Framework for Dengue Control. The WHO Asia Pacific Dengue Strategic Plan (2008-2015) proposed a standard framework for dengue surveillance, integrated vector management, case management, social mobilization and communication, outbreak response, and research. The newly formulated Regional Dengue Framework provides an implementation roadmap. Country targets are modest, e.g., reduce dengue morbidity by 25% by 2020. It will be difficult to further reduce mortality.

162. A challenge will be to improve outbreak response when there is even one dengue case. Late response is primarily due to a lack of community awareness, and a communication gap between the community and the health team. A key strategy is to extend the surveillance system down to the community level, and use syndromic reporting at village/ward level for timely reporting of any suspected case of dengue, followed by quick response. Dengue vaccine trials are also underway, but vaccines are likely to provide only partial protection.³⁹ Several other innovative vector control methods are being explored, such as larvae eating guppy fish, sterile mosquitos, and larvae pellets.

163. In summary, CLMV governments are confronted with dengue on a daily basis and dengue has become a major burden and national priority in all CLMV countries. Yet, partner support in the fight against dengue has been very modest, perhaps in view of limited control options. At the same time, evidence from Central America and Viet Nam demonstrates that dengue control is possible if well implemented. Extending surveillance and response to village level using syndromic reporting and rapid dengue test may work for rural area. Dengue control in urban areas is more complex, and needs close cooperation with local governments and services.

e. Childhood infections

164. Life threatening pneumonia and other severe respiratory infections are the most important causes of death among children and often follow common infections such as otitis, tonsillitis, bronchitis and influenza complicated by a deficient immune system due to malnutrition and cold. Lifesaving treatment is usually available in hospitals but not in health centers and often comes too late. While these are not considered regional diseases, they do affect population resilience and make diagnoses of EIDs complicated.

³⁹ Viet Nam is one of five countries in Asia taking part in the third stage of the experimental process for dengue fever vaccine.

165. Diarrheal diseases are an important cause of child death and contribute to malnutrition and increased vulnerability of populations to other infections. Diarrheal diseases are associated with lack of clean water supply and sanitation, and poor hygiene and food safety. Both urban and rural settings with increasing populations and wastes need much better sanitation in public places. IHR/APSED assessment scores food safety quite high, but that only focuses on coordination, not on the need of improving food safety.⁴⁰

166. Routine immunizations prevent many childhood infections that can easily spread across borders. Maintaining high immunization levels, despite a low burden and at considerable cost, is important. Full immunization coverage is about 85% in Cambodia, 45% in Laos, 85% in Myanmar, and 95% in Viet Nam. Lack of funds has also slowed down the introduction of new vaccines including Hepatitis B vaccine for all newborns and Japanese encephalitis B vaccine in some areas, typhoid vaccine, and cholera vaccine for endemic areas. Rubella-measles vaccination campaigns have targeted children aged 9 months to 14 years. Vaccination against three other common and dangerous bacterial infections and rotavirus are not yet included because of costs. While rabies, a regional zoonosis, and snake bite are killing in particular also children, these antidotes are not available in many places.

167. While EPI will continue to be supported by GAVI and UNICEF, governments have been asked to finance delivery of routine immunization, while UNICEF is expected to provide the vaccines and GAVI will focus on introducing new vaccines. A regional vaccine supply facility is being considered. A common problem in the CLMV countries is the quality of vaccine when it reaches the child. All countries report cases such as measles, which indicates that at least some vaccinated children do not develop immunity. An immunization study is being proposed.

168. In particular in Laos, there are pockets of low immunization coverage, mainly among ethnic groups, so herd immunity is not achieved, and resulting in outbreaks of measles, diphtheria, whooping cough and tetanus. This is despite many years of efforts to improve vaccination coverage. With the help of special campaigns and funds, polio and measles coverage are high. However, even here some villages were identified with very low immunization coverage that had cases of polio due to cultural issues relating to immunization among certain ethnic groups. A large cold chain network is in place reaching the health centers. The main issue for gaps in immunization coverage is probably lack of access, in particular during the rainy season. Financial problems and affordability of travel may also be considered. External funding for EPI has been substantial with support of Japan, Lux Development, GAVI and UNICEF, but some partners have pulled out.

169. Based on the Global Vaccine Action Plan (2011-2020), the Myanmar national EPI program provides immunization services to children below the age of one year and pregnant women. Children below one year receive eight antigens. Immunization status for both children and women is reportedly above 85% in most states and regions. The country aims to maintain tetanus and polio-free status, eliminate measles and rubella, achieve universal coverage, and introduce new vaccines. Myanmar is working with neighboring countries in the control of vaccine preventable diseases: in 2013 it was agreed to identify high risk populations, share data on EPI surveillance, and synchronize activities where possible.

⁴⁰ ADB. 2010. Regional: CAM/LAO: Trade Facilitation: Improved Sanitary and Phytosanitary (SPS) Handling in Greater Mekong Subregion Trade Project. The project supported standards for processed food for export in the GMS, but not for public food safety or food safety in public places such as restaurants and markets.

f. Other infectious diseases

170. With support of Sabin Institute, WHO, ADB and other partners, major progress was made in the control of NTDs, in particular parasitic infections⁴¹ that may be water or food-borne or transmitted through mosquitos or river snails, including amoebic dysentery. These diseases in particular affect the rural poor. Improvement of hygiene and sanitation of the target population is the long term solution. The CDC2 project had made an initiative improving village conditions through the model healthy village project. This was quite successful in the Laos and also started taking root in border areas in Cambodia and Viet Nam. However, the burden of these diseases is very high. Fortunately, mass drug administration (MDA) campaign is effective for most infections and is safe, low cost, and with high impact on child malnutrition, infections, and mortality.

171. MDA was provided for pre-school and school children and women of child-bearing age (WCBA). Almost 100% coverage was achieved in Cambodia and Lao, and somewhat less in Viet Nam. There are several problems with the MDA program, as entire villages including pets are not being treated for STHs. No major efforts have been made in education and social marketing. However, MDAs are often combined with vitamin A distribution. International efforts to control NTDs have accelerated.

172. Hand, foot and mouth disease was first reported in Viet Nam in 2005 and started showing an increasing trend since 2011. In 2014, there were 80,685 cases reported nationally with eight deaths. Compared to the average for the period from 2011 to 2013, the number of cases decreased 31.9% and the number of deaths decreased 90.0%. However, hand, foot and mouth (HFM) disease still circulates at high level in many provinces/cities. The control of HFM disease is not highly effective because there is no disease-specific prevention measure.

173. The extent of several other infectious diseases of regional importance is not known including brucellosis, leptospirosis, and scrub typhus. Japanese encephalitis and meningitis cause considerable morbidity and mortality in northern provinces/states of Myanmar, Laos and Viet Nam. Viet Nam produced a WHO approved Japanese encephalitis vaccine which ADB has also been financing. A fever study is being considered to determine common causes of fever.

VI. HEALTH SYSTEM ISSUES

a. Sector Coverage

174. Public health security requires (i) specific public health security systems; (ii) general health sector capacity; and (iii) general government and public support. The project emphasis is on the first item, but needs to build on the existing system. In 1978, GMS countries committed to Health for All through Primary Health Care, which is essential health care based on the needs of the community, and provided in partnership with the community.⁴² In 2015, government adopted the sustainable development goals, including Universal Health Coverage (UHC).

175. UHC requires all people to have access to affordable quality health care, which in turn depend on community conditions, sector management, governance and financing. Coverage of health services (use by population) reflects both demand and supply of health services. While it primarily indicates patients accessing services, if services are unsatisfactory and costly, it is

⁴¹ The main burden is caused by various types of soil transmitted helminths, and foodborne trematodes.

⁴² WHO. 1978. Alma Ata Health for All Declaration.

assumed that patients will use services less. Table 9 shows coverage for specific health services that are typically receiving major assistance. Even for these services, indicators for Laos and Myanmar are lower, suggesting that many people do not access public services and hence are outside the surveillance system. It is important to understand how this will affect public health security, which may be done by examining the six areas mentioned, and should in fact be part of APSED evaluation.

Table 9: GMS Health Services Coverage, 2012*

Indicator	Cambodia	Laos	Myanmar	Viet Nam	China	Thailand
Proportion of birth attended by skilled personnel	71	40	64	86	95	99
Measles immunization rate at 12 months	90	82	86	98	99	99
Contraceptive prevalence rate	51	50	40	88	78	79
Antenatal care rate 4 visits or more	80	37	70.6	60	95	80
TB treatment success % smear positives	94	90		91		81
Antiretroviral coverage of HIV positive patients	84	51	48	58		76

Source: WHO; * or nearest date

176. GMS governments have rapidly expanded basic health services, basically by adding and upgrading health centers/commune health stations, so that every administrative area has a facility.⁴³ Physical access to health services in CLMV countries is now much less of a problem with the construction of rural access road and the development of a network of health facilities and village health workers. There still are inaccessible pockets in Cambodia, Lao and Myanmar, in particular during the rainy season, and access may also be affected by security problems. In terms of access to specific services, CLMV Governments have made major progress in improving coverage for maternal and child health, immunization, and HIV, TB and Malaria, but even these programs do not reach certain MEVs (which in turn affects MDGs). Also, unavailability of essential services like emergency surgery and insufficient funding for HIV and TB treatment in district hospitals may reduce public use of preventive services. Those lacking official citizenship or migrant worker authorization may be denied services. Patients accessing private services, potentially with an EID, may not be reported centrally. The surveillance system needs to find solutions to deal with these information gaps.

b. Quality of Care

177. While a large network of basic health infrastructure is in place, service delivery has not kept pace with this rapid expansion. Demand for public health services, if available, may be low due to poor quality of care and high cost. It is not well known to what extent quality and affordability affect demand for health services. But household surveys show that the use of district hospitals, station hospitals, health centers and health posts in CLMV countries is very low compared to what would be expected based on catchment population and epidemiology, at less than one visit per person per year. Many patients use private services or self-treatment instead, and some use traditional medicine. Large public hospitals are typically overcrowded, for both outpatient and inpatient care. This also has implications for laboratories, hospital hygiene, and handling infectious patients. Private hospitals are still few. For serious conditions, people

⁴³ Cambodia plans health services based on health districts named "operational districts".

may travel to Thailand or elsewhere, adding the risk of spreading drug resistance, cholera, and EIDs.

178. Low use of health services may reflect unavailability of services because of staff absenteeism (e.g., due to lack of transport or security, or housing for women). Specific services may be missing such as for immunization, laboratory tests, or emergency child care. Unavailability of such services means a gap in surveillance and impact on infection control. Low use of services may also indicate poor quality of services, or simply the public view that spending more at higher level gives better care.

179. Problems of quality of care in the rural health services are linked to multiple factors but in particular also staff working conditions, competency and attitude.⁴⁴ Another major issue is lack of recurrent budget to operate the services. Other quality issues are poor facilities and hygiene including lack of water and sanitation. From a surveillance point of view, MOH may assume diagnostic services are functioning when these are not. Monitoring the quality of services is lacking in all countries, so MOH does not really know what zero reporting of suspicious infections means if diagnostic or syndromic reporting capacity of staff is lacking. Monitoring of quality of services at health centers will help identifying underperforming facilities and put meaning to reported data.

c. Governance

180. **Devolution.** In Laos and Viet Nam, health services are devolved to provincial level. The concept is that it is easier to manage a complex system closer to the public, and that leadership will be more engaged, accessible and accountable. Cambodia MOH is using health management agreements (kind of “contracting out” within the public system) between MOH and operational districts (ODs). However, heads of ODs are not elected or contracted but public servants. Myanmar is planning further devolution to state/region level (discussed below). Devolution offers better owned and customized management, but poses risks in terms of lack of capacity, non-adherence to MOH policy and monitoring, a focus on provincial/state hospitals, and symbolic investments. Among some local governments, hospitals are seen as good sources for generating revenue.

181. **Sector management.** While devolution creates more complex governance systems, health sector management in CLMV countries still need to strengthen core capacities in planning and budgeting, resource management, and monitoring. Bottom-up planning and budgeting has been introduced but remains fragmented due separate planning and budgeting of vertical programs with unbalanced allocations and lack of financial flexibility of health facilities. Surveillance and response services are often underfunded as it is not seen as a priority. For example, provinces/states do not have an emergency fund standby in case of an outbreak of cholera or dengue requiring very quick response. Sector-wide approaches are being advocated. Cambodia MOH has introduced sector-wide implementation, and Lao MOH health reform plans also amount to a sector-wide program approach. The new Myanmar Government also favors a comprehensive planning approach. For all countries, a problem is how to link central and local government priorities, plans, and budgets.

182. **Resource management** (people, assets, finance) in the four ministries of health has been problematic, in part simply due to guidelines, manuals, standards operating procedures,

⁴⁴ Private clinics and public facilities that operate like a private clinic may be offering popular services at a price, but high demand is not the same as quality of services.

and lack of information as good computerized data management systems are still under development. Another set of issues related to governance problems in human resource and financial management and in procurement. A major issue for public health security is weak human resources development resulting in staff maldistribution, absenteeism, and lack of accountability. All CLMV countries have human resources constraints for financial management and procurement.

183. Separate financial management assessments and procurement risk assessments have been done for the four countries, and are available in supplementary appendices. Surprisingly little information is available regarding public health sector procurement. The procurement risk was assessed to be moderate except for Myanmar, which was high. Partners are now being pressed to start using the Government system for procurement, which is encouraging. Major procurement reforms and capacity building are likely to be required. Fiduciary assessments have been carried out more regularly in CLMV countries, and have demonstrated weaknesses in financial management such as poor book keeping, and late liquidation of funds. Part of the problem is created by late release of annual funds. The financial management risks were also assessed as moderate except for Myanmar, which was high. A risk mitigation plan has been proposed.

184. **Community engagement.** An important public health security concern is community engagement, as both health services and communities become part of broader economic development, traditional community engagement, responsiveness and ownership of their own community health (including such things as waste management) is under pressure. Communities have been engaged in health services through various channels including religious and social organizations, village health committees, community health workers, mobile clinics, campaigns and public works. While local health center staff, as community members, continue to be informally active in local communities, reduced community engagement undermines their intermediary role in public health security. Intense engagement of communities is especially important in the least mainstreamed traditional communities, but government conditions are often lacking to do so effectively. Cambodia has successfully explored public-private partnership, and contracted NGOs to circumvent some of the public sector restrictions to engage with remote ethnic minorities. Similar approaches should be considered for migrant communities that are now often out of reach of government programs.

185. **Partners**, since the late 1990th, have concentrated on few diseases and subsectors. This so-called “package” approach undermines local realities, in that no patient can be denied some service, and local priorities for health services may be different from those perceived by partners which is typically driven by international goals. Partners have been increasingly ignoring the role of communities in improving health services, despite hard data to the contrary. Partners are now seeking to re-engage with communities and invest in health system development, governance, and financing.

186. **Myanmar.** Myanmar is a special case having a new Government after many years of command economy. Appraisal of the old system is probably less relevant, but the “Health in Transition” report for Myanmar says that “transparency and accountability are new terms arriving with the current civilian government.” The market economy also comes with its shortcomings due to imperfect competition. Doctor-patient interaction in Myanmar is also based on information asymmetry and provider-dominated (Mugrditchian & Khanum, 2006), and patient information is minimal.

187. While the government machinery was a big black box, what made the system work for so many years of accommodation self-reliance were the professional ethics, dedication and persistence of health workers, for example community midwives taking initiative to rebuild their health centers after cyclone Nargis from whatever material they could find. This is the backbone of rebuilding Myanmar's health sector. Hopefully, reform measures such as a participatory planning process, transparency, and accountability will push through.

188. Based on the new constitution, the government plans to form regional legislatures for actual devolution of authority. Based on the National Comprehensive Development Plan (NCDP) 2011-2031, comprehensive 5-year health sector plans will be formulated. However, within this framework, planning is done by individual departments, although under the umbrella of an overarching consultation process. The result is a health system largely managed like vertical programs except for matters like personnel and financial management. There have been voices to return to the earlier People's Health Plans approach, more of an integrated and bottom up planning process. Various intersectoral collaboration mechanisms are also in place, in particular for food and drugs, occupational hazards, and disaster management.

189. The role of NGOs and the private sector is important in Myanmar to achieve UHC. Collaboration with NGOs and the private sector is limited but a good example is TB control. The MMA plays a key role in quality standards in the private sector, and also in public-private partnership, in particular with support of Population Services International, which has helped develop the Sun Quality Health Network or (peri)urban areas and Sun Primary Health for rural areas engaging over 3000 providers in almost 300 townships. Based on the 2012 Social Security Law, a partly mandatory social protection system is to be developed. A new concept paper prepared by government officials and partners proposes a basic health care package for the entire population provided free of charge except for the formal sector. Hopefully, interventions for public health security will be part of this UHC package.

d. Financing

190. Achieving millennium targets for health, nutrition and population welfare requires mobilization of funds for developing Primary Health Care (PHC) systems focusing on cost-effective interventions that can be readily provided in the local context. It also requires special efforts to improve sector management and reach vulnerable populations with often the worst indicators.

191. The poor are also denied care or obtain second rate treatment when they cannot pay the out-of-pocket fee. All countries are making efforts to make services more affordable for the poor⁴⁵, but the out-of-pocket share has remained high. Unless this is resolved, UHC is unlikely to be achieved, and with that also public health security as groups of people are outside the surveillance system. A primary reason for high out of pocket cost of public health services is low public health spending, in particular in Laos and Myanmar. Lack of recurrent budget for services also contributes to poor quality of care, which in turn undermines staff capacity and public confidence in health services, and contributes to a surge in private clinics, including those run by public health staff.

⁴⁵ Such as the Thailand 100 Bhat scheme, health care funds for the poor in Viet Nam, health equity funds in Laos and Cambodia, and donations boxes in Myanmar.

192. In 2001, the Commission on Macroeconomics and Health of WHO estimated that a basic package of health services in the least developed countries would cost \$34 per capita.⁴⁶ In 2004, per capita health expenditure in Cambodia was \$30, Lao \$10, and Viet Nam \$21. Per capita health expenditures in 2013 in Cambodia was \$67, Lao \$32, Myanmar \$14, and Viet Nam \$111 (Table 10). Health spending have not kept pace with overall economic growth, while these are expected to increase faster with more income. The prolonged low spending on health has eroded human resources and facilities, and reduced sector impact and efficiency. It will take additional investments to recover from years of neglect.

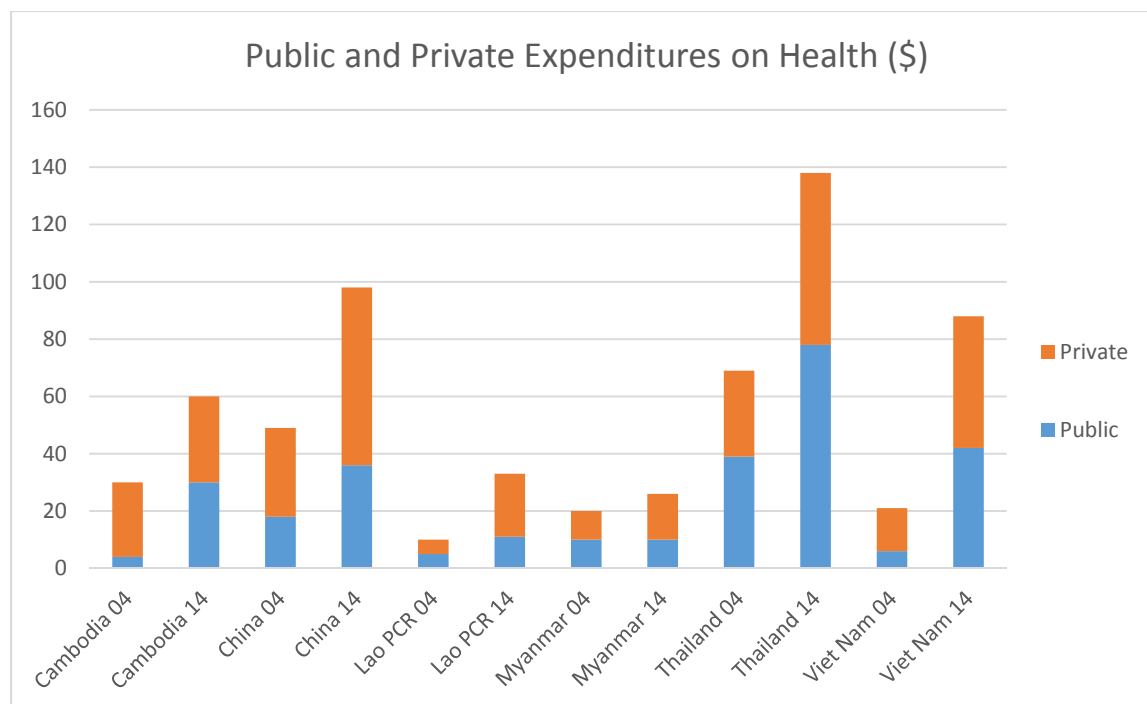
Table 10: GMS Health Expenditure Data

	Cambodia	Laos	Myanmar	Viet Nam	China	Thailand
Health expenditure 2013 per capita	67	32	14	111	367	264
Total exp on health as % of GDP 2013	7.5	2.0	1.8	6.0	5.6	4.6
% public share on health 2013	20.5	49.3	27.2	41.9	55.8	80.1
Total govmt exp on health as % of total govmt spending 2013	7.7	3.5	1.5	9.3	12.6	17.0
Ext sources as % of total spending on health 2013	13.3	26.8	15.3	2.2	0.1	3.8
Out of pocket spending on health as % private spending	75.1	78.8	93.7	85.0	76.7	56.7

Source: World Bank

193. The high share of out-of-pocket expenditure is a major concern in all countries, indicating that governments failed to protect the poor from medical expenses. A major concern is that most private spending is out of pocket, and that this is not limited to the more well-to-do. Hence, affordability of health services is a major issue with implications on health security. Comparing 2004 and 2014, Cambodia, Thailand and Viet Nam show a strong trend towards 50% of public spending. Cambodia, Laos and Myanmar receive major external aid for their public health budgets, up to half the total.

⁴⁶ WHO. 2001. Report on Macroeconomics and Health.



Source: World Bank Data

194. Government health sector budgets continue to show considerable imbalances between investment and recurrent spending, hospital and lower level services, and preventive and curative care. There are also major geographical imbalances in health spending linked to local government revenue, and imbalances by various target groups.

195. Actual information sharing and planning at both national and provincial/state levels, in particular between general services and specific disease control programs financed by partners is considered quite good in Cambodia, but weak in Laos, Myanmar, and Viet Nam. The problem in Myanmar is that donor funded NGOs do not coordinate much with MOH services, apart from regular meetings. In Laos and Viet Nam, the problem is lack of coordination between MOH departments, while provincial health offices make more effort coordinating services and programs.

196. Both national and provincial levels in CLMV countries should make more effort to plan health services for MEVs, including migrants and those living in sometimes hard-to-reach border areas. In mountains of CLMV countries, ethnic minorities often represent the main share of the population of provinces/states. However, in particular in these provinces/states, the most remote, vulnerable and poor ethnic minorities are often not reached.

197. Thailand has promoted private hospital services as an important economic sector. The private sector in other GMS countries is mainly outpatient care. Little effort is made to improve the quality of private services and deal with quacks. Various pilots to strengthen the private sector have showed promising results like self-regulation of doctors through a local medical association.

198. Other areas of interest are social marketing and food fortification. NGOs are also increasingly recognized for their potential to provide complementary services. Governments

have been contracting NGOs to provide services. GMS Governments increasingly recognize the potential of these reforms.

199. In particular at times of economic crisis, government spending should be countercyclical but often result in serious cuts and imbalances. DMCs will need to undergo substantial financing reforms to make the sector more equitable, efficient and effective. Studies on sector efficiency suggest that through efficiency measures, at least 10% of current spending in the sector could be reallocated.

e. Monitoring

200. In Cambodia, the MOH Department of Planning and Health Information Systems has a comprehensive health information system (HIS). It realizes the problem of capturing health information for people not making use of public health services such as some poor ethnic minorities and migrants and is considering options to track these groups. The MOH infectious diseases surveillance system has started to include information from the private sector. The sentinel stations for diseases like dengue need to be expanded to cover all health facilities. Eventually, MOH Cambodia is looking forward to a web-based, comprehensive Health Information System for all formal health services.

201. In Viet Nam, MOH has placed strong emphasis on the HIS.⁴⁷ The HIS challenges include HIS fragmentation, linking HIS in the devolved system, and quality problems. The MOH is collecting 127 indicators, including population health status, system performance, and output/activity indicators of the health sector. Most indicators are collected manually and eventually in Excel files through a series of logbooks. Data of the national target programs and preventive medicine are hard to access. Monitoring the disease burden is not done routinely in all health facilities. There is no platform for integration of clinical, prevention, and lab data at any level. Data on private health services is also lacking. The surveillance system is managed separately as it requires immediate reporting of priority diseases, weekly reporting of 11 of these diseases including EIDs, and monthly reporting of 28 notifiable diseases.⁴⁸ The used software, e-CDS⁴⁹, allows for upgrading. However, HIS and surveillance data are not linked at central level. Advancing IT requires equipment and training at district and commune levels.

202. In Laos, MOH is rolling out a nationwide HIS, based on the Oslo district HIS software. MCH monitoring has been integrated in the HIS, but not yet other priority programs. Eventually, the idea is to make DHIS demand driven rather than supply driven, in that it will monitor the information that is required, e.g., core services, and a basket of specific services based on needs. HIS is still not so strong, and provincial data use limited. As in Viet Nam, there is also a disconnect between HIS and governance structures.

203. In Myanmar, MOH has a comprehensive health management information system, with separate collection systems for surveillance and most priority programs. Most state/region health offices are capable of analyzing their health data. There are three major problems. Data are mostly managed manually at commune, township and district levels. Second, while MOH produces comprehensive annual health reports, the data quality is unreliable. For example, the

⁴⁷ MOH Viet Nam Strategic Implementation Plan for Developing the Health Statistics in the Period 2011-2020; and Instruction No. 02/CT-BYT on promotion of development and application of informatics technology in health sector.

⁴⁸ Circular 48 /2010/TT-BYT of Ministry of Health on infectious disease reporting.

⁴⁹ e-CDS - Electronic communicable disease surveillance (system), developed by ADB funded project (ADB 47)

priority infectious disease reported from very diverse states/regions show a very similar pattern. Third, many services provided by NGOs, military, other agencies and the private sector are not captured.

VII DEVELOPMENT COORDINATION

a. External Assistance

204. Since the 1990s, external aid to the health sectors in Cambodia, Lao and Viet Nam has been increasing steadily (Table 11) until recently, but is declining as a percentage of public health spending, with a rapid increased both domestic public and private health spending.

Table 11: Trends in ODA Spending on Health

ODA Disbursement Indicators	Year	Cambodia	Laos	Myanmar	Viet Nam	Source
Health ODA per capita	2005	8	7	1	2	WHO
	2010	14	9	2	3	WHO
	2014	13	9	5	3	OECD
Health ODA as % Total ODA	2005	23	15	30	7	WB
	2010	26	13	28	8	WB
	2013	25	14	7	6	WB/WHO
Health ODA as % of public health spending	2005	114	233	200	20	WHO
	2010	82	60	100	9	WHO
	2014	62	18	19	7	OECD/WB
Public health spending per capita	2005	7	3	0.5	10	WHO
	2010	17	15	2	32	WHO
	2013	21	49	27	42	WB
Private health spending per capita	2005	28	18	5	27	WHO
	2010	28	31	15	51	WHO
	2013	75	79	94	85	WB
THS as % GDP	2013	8	2	2	6	WB

Sources: WHO. *Official Development Assistance for Health*. 2010; Organization for Economic Co-operation and Development Assistance Committee; *Development Cooperation at a Glance, Statistics by Region. 4 Asia*. 2016; World Bank: *World Development Indicators*. 2014

Note: The table presents disbursement data. Commitments are less stable but more forward looking.

205. Main global drivers of health assistance in this millennium have been the HIV/AIDS epidemic, spending on maternal, neonatal and child health (MNCH) in a rush to achieve MDGs by 2015, countries graduating from least developed country status, and new sources of funds, while investment by western bilateral agencies has declined sharply. This compares to earlier drivers such as family planning, malaria, infrastructure, and human resource development. In the GMS, there is a shift to financing income generating hospitals based on the shift in the burden of diseases, which does not take into consideration the cost and effect of disease prevention, and global and regional public good, for which the governments seek external aid.

206. The evolving global market, communication networks and information technology have increased exposure and visibility of beneficiaries, local leaders, governments and funding agencies. Engagement of philanthropic institutions, NGOs and the private sector is increasing, offering new possibilities for mobilization of resources and improving performance. Local leaders are not only increasingly exposed to new demands, but also to approaches and

performance standards in other places. Increased exposure is likely to push for recognition, participation, competition, transparency and accountability.

207. The outbreaks of SARS and avian influenza triggered an increase in funding from ADB, European Union, Japan, USA, and other partners. Since the Ebola outbreak in 2014, external support for EIDs is being re-prioritized. The proposed USA-led Global Health Security Agenda may provide a global alliance against EIDs. However, domestic health spending on EIDs remains small.

208. The GFHTMs increased global funding for HTM from 6% to 38% between 1990 and 2010, before it started to decline.⁵⁰ Even so, funding for HTM control is insufficient to conduct full scale prevention, case finding and treatment programs. GF has indicated that financing of HTM control in the GMS may decline in the near future. The control of dengue and other significant infections receives much less aid. A short list of major GMS health projects is in Table 12.

209. As external aid becomes less significant in health sector financing, it is important to understand how these funds are leveraged for learning and impact. As external funds are declining and domestic spending is increasing, HMT and immunization programs need to be better mainstreamed, and provincial plans need to include specific strategies and budgets how to finance HMT for MEVs as an essential part of regional health security.

Table 12: Major Development Partners or Regional CDC

Location	Development Partners	Project Name	Duration	Amount (\$ million)
GMS	ADB, DFAD, DfID	Second GMS Communicable Diseases Control Project Extension – Regional Part	2015 – 2017	5.0
	ADB, DFAD, DfID	Regional Capacity Building Technical Assistance for Malaria Elimination and CDC	2016 – 2017	12.0
CAMBODIA	ADB, DFAD, DfID	Second GMS Communicable Diseases Control Project and Extension	2010 – 2017	14.0
	AFD, BTC, DfID, DfID, Korea UNFPA, UNICEF, World Bank	Health Sector Support Program Phase II and III	2009 – 2015 2016 – 2020	149.8
	GF	Malaria, TB, HIV/AIDS control projects		
LAOS	ADB, DFAD, DfID	Second GMS Communicable Diseases Control Project and Extension	2010 – 2017	15.0
	ADB	Strengthening HIV/AIDS Prevention Capacity in the GMS	2012 – 2018	5.0
	GF	Malaria, TB, HIV/AIDS control projects	2016 – 2017	25.2
	ADB	Health Sector Governance Program	2015 – 2020	23.0
	EU/UNICEF	Multisector Nutrition Support Program in the Laos	2016 – 2020	55.5
	Lux Development	Lao-Luxembourg Health Sector Support Programme Phase II	2014 – 2020	25.5
	World Bank	Health Governance and Nutrition Development Project	2015 – 2020	26.4
	WHO	Systems Strengthening Program/Support for Health Sector Reform	2015 – 2020	15.0
MYANMAR	ADB, DFAD, DfID	Malaria and CDC Project in the GMS including regional support	2016 – 2017	5.2
	ADB, JFPR	Strengthening HIV Prevention Capacity in the GMS	2015 – 2018	10.0
	GF	Malaria, TB, HIV/AIDS control projects	2016 – 2017	
	WHO	WHO Program for Health Systems Strengthening and CDC		
VIET NAM	ADB, DFAT, DfID	Second GMS CDC Project and Extension	2010 – 2017	29.5

⁵⁰ <http://www.healthdata.org/news-release/global-health-funding-reaches-new-high-funding-priorities-shift>.

ADB	Strengthening HIV/AIDS Prevention Capacity in the GMS	2012 – 2018	15.3
China	Construction of the Hanoi University of Pharmacy	2013 – 2017	45.0
GF	Regional Initiative to Prevent Artemisinin-Resistant Malaria	2014 – 2016	15.0
ADB	Second Health Care in the Central Highlands	2014 – 2019	50.0
Korea	Building Hanoi Medical University		45.0
World Bank	Health Professional Education and Training for Health System Reform	2014 – 2020	116.0
World Bank	North-East and Red River Delta Regions Health System Support Project	2013 – 2019	150.0
World Bank	Hospital Waste Management Support Project	2011 – 2017	150.0

3MDG: 3 Millennium Goal Development fund; ADB: Asian Development Bank; AFD: Agence Française de Development; BTC: Belgium Technical Cooperation; DFAT: Department of Foreign Assistance and T; DfID: Department for International Development; GF: Global Fund to Fight AIDS, Tuberculosis and Malaria; EU: European Union; JFPR: Japan Fund for Poverty Reduction, JICA: Japan International Cooperation Agency; UNICEF: United Nations Children's Fund; UNFPA: United Nations Population Fund; UNICEF: United Nations Children's Fund; WHO: World Health Organization; .
Sources: Ministries of Health of Cambodia, Laos, Myanmar, and Viet Nam; ADB; internet sources.

b. Aid Coordination

210. The International Health regulations (IHR (2005) of WHO provides a strong and legally binding standard for the control of EIDs and other serious public health threats, such as the spread of drug resistant infections. In the GMS, the IHR is implemented through the APSED (2005, 2010). WHO has also demonstrated strong technical leadership in formulating regional control strategies for health security related areas including for the control of HTM, dengue, and NTDs; and also related health systems such as for MNCH, laboratory services, and health financing.

211. In Cambodia, the MOH has a policy of harmonizing and integrating projects under one sector wide implementation program (SWIm). In the Laos, the MOH has introduced a sector-wide coordination mechanism and sector program approach in 2009.⁵¹ In Myanmar, the Country Coordinating Mechanism (CCM) oversees the national strategies of HMT and MNCH. In Viet Nam, the Health Partnership Group (HPG), chaired by the MOH was established in 2004 to improve strategic planning, monitoring, coordination and efficiency of the entire health sector.

212. ADB GMS projects are coordinated through the GMS steering committee (which includes WHO), workshops, and a regional coordination unit based in MOH, Laos; and technical forums on such topics as AI, dengue, NTDs, and cross-border cooperation. ADB projects are informally coordinated with other partners. ASEAN provides high level political commitment to regional health security. The MBDS program supports cross-border cooperation and disease surveillance at border crossings.

213. Ministries of health in CLMV countries have put sector and aid coordination structures in place for health systems development.

- (i) In Cambodia, MOH manages a comprehensive Health Sector Program (HSP) 1, 2 and 3, which is financed by the Government and a consortium of partners led by the World Bank. Most funds are pooled, but partners including ADB provide parallel funding for subsectors coordinated under the HSP umbrella.
- (ii) In Laos, MOH has initiated the health sector program approach and formulated the health sector reform strategy and framework toward UHC. A sectorwide coordination mechanism is in place, with technical groups.
- (iii) In Myanmar, MOH converted the Country Coordinating Mechanism set up under the Global Fund into the Myanmar Health Sector Coordination Committee, under which all subsector technical groups work. Myanmar also participates in the IHP.
- (iv) In Viet Nam, MOH chairs the health partnership group, which includes representatives of various partner groups including NGOs. MOH also issued the joint annual health reviews providing details of sector program, and participates in IHP with a JANS.

c. ADB Performance

214. In the GMS, ADB has been supporting (i) general health systems development and reform; (ii) CDC; (iii) human resources development (HRD); and (iv) pilots and studies such as for safe motherhood, early childhood development (ECD), immunization, model healthy village, and information technology.

⁵¹ ADB. 2009. *Health Sector Development Program, Lao PDR*. Manila

215. For GMS, ADB has been supporting 7 CDC projects and 10 advisory technical assistances. TAs were provided for public information, ethnic minorities and migrants, model healthy village, vaccination, e-Health, SARS, AI, HIV, malaria, and dengue control. In addition, PPTAs and capacity building TAs were provided. ADB and WHO/WPRO have been working together in CDC through various projects.⁵² In 2005, ADB and WHO/WPRO supported the first GMS Regional CDC Project,⁵³ and in 2009, ADB supported the Second GMS CDC project for \$54 million,⁵⁴ which was extended to 2017 for malaria control and CDC with a supplementary grant of \$9.5 million (Cambodia \$4 million, Laos \$3 million, and Viet Nam \$2.5 million).⁵⁵ ADB currently supports a GMS HIV/AIDS project for Laos and Viet Nam,⁵⁶ and a HIV/AIDS project in Myanmar.⁵⁷ ADB wishes to integrate its assistance into one GMS CDC program.

216. CLMV countries also receive support from ADB's regional malaria and other communicable diseases trust fund supported by bilateral partners to support malaria control with a focus on artemisinin resistance, including capacity building of national regulatory agencies for drug control. ADB also manages the Asia Pacific Leaders Malaria Alliance (APMLA) secretariat to mobilize support for malaria control and eradication.

217. ADB GMS projects are coordinated through the GMS steering committee (which includes WHO), workshops, and a regional coordination unit (RCU) based in MOH, Laos. ADB projects are informally coordinated with other partners, in particular WHO. At strategy level, coordination for regional health security takes places through WHO regional offices. ADB has been providing support for the formulation of strategies through organizing and financing technical forums on such topics as AI, dengue, NTDs, and cross-border cooperation. ASEAN provides high level political commitment for regional health security.

218. Other partners that play an important role in CDC are USAID, which is rolling out the Global Health Security Agenda; the Global Fund for the control of HMT; the 3D fund for MCH in Myanmar; WHO for CDC and health system technical support; GAVI and UNICEF for immunization; UNICEF for water and sanitation; UNAIDS and UNFPA also for HIV control; and the World Bank for hospital infection control in Viet Nam. While there is a concentration on HMT, funding is still inadequate and as countries graduate to middle income status, future financing of HMT by Global Fund and bilateral agencies is uncertain. There is less support for the control of EIDs, other major infections such as dengue, diarrheal diseases (including cholera), NTDs (including Japanese encephalitis), and the control of drug resistance. Immunization levels are high for common antigens except in the Laos. Bilateral agencies focus on health system development, while nongovernment organizations are particularly active in reaching vulnerable groups and community work. Aid coordination mechanism are improving at central level, in subsectors, and increasingly also at provincial level.

219. Apart from ADB-financed projects, the MBDS program supports cross-border cooperation and disease surveillance at border crossings. The proposed USAID led Global Health Agenda is also expected to become active in these countries.

220. Important lessons have been identified in GMS health projects. The main concerns are

⁵² ADB TAs listed in Table 12

⁵³ ADB. 2004. *GMS Regional Communicable Diseases Control Project*. Manila.

⁵⁴ ADB 2009. *Second GMS Communicable Diseases Control Project*. Manila.

⁵⁵ ADB. 2014. *Malaria and CDC Project in the GMS*. Manila

⁵⁶ ADB. 2012. *Strengthening Capacity for HIV/AIDS Prevention in the GMS*. Manila

⁵⁷ ADB. 2012. *Strengthening Capacity for HIV/AIDS Prevention in Myanmar*. Manila

with targeting, efficiency, and sustainability. Projects experienced difficulties reaching certain high risk groups due to sensitivities, insufficient program financing at provincial level, and simply poor access. This is still a major issue in Myanmar, and perhaps the Central Highlands in Viet Nam. Technical capacity in all four countries is still limited, and support is usually provided by WHO, USAID, JICA and other agencies. Administrative capacity of ministries of health has improved over the years, but remains fragile due to staff constraints. Provincial capacity for project implementation has also improved in terms of planning and budgeting, but capacity for implementation varies considerably. The decentralized nature of project activities with multiple small expenditures requires regular inspection. Some other lessons learnt based on CDC project evaluations are as follows:

- (i) Provinces take initiative in regular cross-border cooperation but not in targeting MEVs. Provincial plans do not specifically address needs of MEV;
- (ii) Improving regional health security requires improving health systems in border areas;
- (iii) Reducing the risk of drug resistance requires continuity of care across borders;
- (iv) Regional cooperation requires setting up institutional mechanisms and agreeing on protocols;
- (v) Project teams need training on technical issues, project management, and safeguards; and
- (vi) Financing regional activities from loan funds is complicated.

221.. The CLMV governments have requested ADB to support the GMS Health Security Project (2017-2021) to improve prevention and control of EIDs and other diseases of regional significance in the GMS. CLMV countries are yet to achieve minimum international standards⁵⁸ based on the WHO IHR 2005 and APSED 2010 and other regional strategies. ADB has committed to a GMS Health Security Project for \$125 million.⁵⁹

222. The current setting is favorable for further strengthening regional CDC. The recent epidemics and rapid economic development and connectivity have created a political will to exchange information, impose quality standards, and learn from each other in CDC. The six GMS ministers of health have remained committed to sharing information on CDC since 2003. The WHO regional strategies provide a strong framework for regional cooperation in CDC. However, funding for regional health security, with its many externalities, is to be improved.

VIII. PROJECT DESIGN

a. Project Outline

223. The problem tree is shown in Appendix 1. Based on discussions with MOH and partners, there are three sets of problems to improve GMS health security.

- (i) **Late identification and control of dangerous infections, outbreaks, and epidemics.** This is caused by surveillance and response systems not reaching to village level with lack of syndromic reporting of suspected cases/outbreaks, weak data management, insufficient response capacity due to resource constraints

⁵⁸ GMS Health Security depends on its weakest link, from community to regional levels.

⁵⁹ ADB proposes to provide loans for Cambodia \$21 million, Laos \$12 million, Myanmar \$15 million, and Viet Nam \$80 million.

including transport and cash flow, and insufficient information exchange and cooperation at cross-border, intersectoral and regional levels.

- (ii) **Large pool of at risk and infected people not being reached with prevention and treatment.** Capacity is lacking to reach particular vulnerable groups including poor ethnic groups and migrants. Support for priority programs like HIV/AIDS, TB and malaria is insufficient to treat newly identified cases.
- (iii) **Poor quality of laboratory diagnoses, hospital infection control, and drug resistance prevention.** Insufficient roll out of national programs for improving laboratory services, IPC, and prevention of drug resistance, with lack of quality control and capacity building.

224. Government policy guides the project design:

- (i) **Governments aim to improve economic and public sector performance** in terms of equity, efficiency, impact, and sustainability.
- (ii) **Government investments in the sector are restricted due to fiscal constraints**, so ministries need to be highly selective how to use limited funds to maximize benefits.
- (iii) **Government policies in the health sector are broadly to achieve UHC, and achieve public health security** (contain epidemics and other public health events).

225. **EIDs are the most dangerous diseases** in terms of potential for major and fast global health and economic impact allowing little time for adjusting control measures as needed, and therefore the most critical requirement to improve GMS health security.

226. **The project design is anchored on building IHR/APSED core capacities**, assuming that this is the best way to mitigate the risks of EIDs based on WHO guidance.

227. **Health system elements need to be in place to support core capacities.** Many of these health system elements are addressed by governments with support of partners, including management capacity and targeted disease control programs. The project addresses some of these health system elements in support of UHC, in particular linking those not being reached to health services (assuming governments can do this), and building general capacity for laboratory services and IPC. During project implementation, monitoring should reveal if all conditions are met, and adjustments made if needed.

228. **The project focuses on GMS borders and economic corridors** including with China and Thailand. Border districts represent large numbers of poor ethnic minorities, migrants, and other vulnerable groups.

229. **The project supports a comprehensive CDC program approach** to gradually integrate APSED and CDC under one umbrella to improve access, quality and efficiency, with a focus on peripheral services, quality improvement of diagnoses and infection control, and outreach.

b. Discussion

230. Alternative design options are discussed as follows.

- (i) **The project design should be specific for each country.** Project goal, outcome and outputs are similar with different targets and activities are country specific. The project design in Viet Nam also supports integration of preventive and curative services.
- (ii) **Focus on one part of the subsector,** for example only surveillance and response, IPC or laboratory services nation-wide. Larger provinces/states already have better services and funds to improve these further. No major investments are needed in surveillance and response. In laboratory services and in IPC, there is limited capacity to roll out projects and a phased approach is required.
- (iii) **Focus on a single priority health program.** Programs such as for HIV/AIDs control are already strong with substantial funding. These programs need to be matched with community demand and outreach services.
- (iv) **Focus on fewer provinces.** This would include less critical investments, be restrained by limited local absorptive capacity and sustainability, and leave out many other provinces due to fiscal constraints.
- (v) **Focus on expanding services.** The project design focuses on the “next gaps” in the system, be it medium size provincial laboratories or district health centers, because of efficiency concerns and capacity constraints.
- (vi) **Focus on “hardware”.** The project design aims to include support for training, technical assistance and other “software” to ensure that the system is strengthened and equipment and vehicles are used properly.
- (vii) **Focus on central capacity building.** All MOH do have staff constraints at central level to manage CDC. Selective support will be provided. National laboratories also need upgrading. However, there are many other partners interested in this, and EID diagnosis is sufficiently covered by the Institutes Pasteur.

231. Appendix 4 provides a summary of how different project activities address public health security issues. Accordingly, there are several packages of deliverables:

- (i) **A regional cooperation and knowledge management package** linked to priorities such as information exchange and protocols, syndromic reporting, IPC, laboratory services, and human resources development;
- (ii) **A comprehensive outreach package** planned at district level using transport to reach MEVS and undertake a participatory planning approach that can include a broad range of topics ranging from EID preparedness and syndromic reporting to TB and HIV case finding to vector control to school and environmental health and birth registration to training of village health workers. This means there should be no territorial obstructions from departments;
- (iii) **A surveillance and response package** including risk assessment, pandemic preparedness, and relevant HRD and planning and budgeting;
- (iv) **A laboratory package** for a range of biosafety and quality improvement activities, HRD and inspection, more tests for common health problems, and linkage to surveillance and response;
- (v) **An IPC package** including repair of facilities, management and inspection structures, scholarships and training, case management of highly infectious patients, pandemic preparedness, and linkage to surveillance;
- (vi) **For Viet Nam, a district health service integration and prevention package.**

c. Justification

Beneficiaries

232. **Target Population.** The project is targeting districts with a total population of 3.6 million people in Cambodia, 1.4 million people in Laos, 2.2 million people in Myanmar, and 20.1 million people in Viet Nam, a total of 27.3 million people. The actual number of beneficiaries may be around 10% of this number, about 3 million people. A large number of people in targeted districts are poor and/or belong to ethnic minority groups.

Table 13: GMS Health Security Project Target Population

Target/Output	Cambodia	Lao PDR	Myanmar	Viet Nam
Provinces	13	12	6	36
Border provinces	12	12	6	25
Districts*	40	55	30	360
Border districts	23	36	6	82
Poor districts	11			56
Targeted districts	42	36	12	250
Provincial/state/ region hospitals	12	12	6	36
District hospitals	44	55	30	360
Provincial/state/ region population million	7.6	3.8	11.1	53.9
Targeted district population\ million	4.0	1.4	2.2	20,1
Border district population Million	3.6	1.4	0.7	13,0
Ethnic in provinces million	3.7	1.0	2.0	9.2
Poor in provinces million	1.5	0.4	2.0	6.8

Source: MOH statistics. *In Cambodia, Operation District. In Lao, Udomxay is a border province.

233. In Cambodia, the project targets 13, mostly poor, border provinces along economic corridors out of a total of 25 (Pailin, Battambang and Banteay Meanchey provinces in the northeast; Preah Vihear, Stung Treng, Ratanakiri, Mondulakiri, and Kratie in the north-east; and Kandal, Tbong Khmum, Prey Veng, Svay Rieng, and Kampot Provinces in the south-east). The proposed border provinces will help safeguard gains in connectivity by reducing possibilities for disease outbreaks along these routes. Those in the northeast have significant ethnic minority populations. The total population in the targeted provinces is 7.6 million, with a population of 3.6 million in targeted border districts. Total populations in districts with large ethnic minority populations amount to 3.7 million, but the actual number of ethnic minorities in these districts is not known, in part as large groups of ethnic minorities are mainstreamed and call themselves Khmer. The total number of poor people is estimated at 1.5 million. The north-eastern provinces are the poorest provinces within the project scope.

234. In Laos, the project targets 12 provinces out of a total of 18. Eleven of these 12 provinces are border provinces, comprising a total of 36 border districts out of 55 districts. The selected provinces are: Bokeo, Luangnamtha, Udomxay, Phongsaly, Xiengkhuang and Huapanh in the north bordering Thailand, Myanmar, PRC (Yunnan), and Viet Nam; Bolikhamsay and Khammuane in the center bordering Thailand and Viet Nam, and Attapeu, Saravane, Sekong and Champasack in the south bordering Thailand, Cambodia and Viet Nam. With the exception of Champasack, these are among the poorest and least developed

provinces of Laos. The total catchment population in these 12 provinces is estimated at 3.0 million (2015), with about 1.4 million living in the 36 border districts including 1.0 ethnic minorities (Appendix 7). By targeting border areas, the project is disproportionately targeting the poor, as was shown in Lao Expenditure and Consumption Survey 2012/2013.⁶⁰ This supports an earlier 2004 study, which also reported that poverty is concentrated along the Laos-Viet Nam border, and that focusing on these border areas will more greatly benefit the poor.⁶¹ Within the targeted provinces, the project is not specifically targeting the poor and vulnerable groups except under output 1 for MEVs. Project inputs will be made available to reach these MEVs.

235. In Myanmar, the project targets five states and one region out of a total of 14, in the eastern part of the country along the borders with Thailand, Laos and China-Yunnan province. The focus states and region have been selected because they are deemed to be at increased risk of epidemic outbreak of communicable diseases, not because these are mostly poor provinces. Nonetheless, the five focus states - Shan North, Shan East, Kayah, Kayin, and Mon - have a majority ethnic minority population (who are frequently also poor), and the one focus region, Tanintharyi, has a large migrant labor population. Targeting economic corridors will help safeguard gains in connectivity by reducing possibilities for disease outbreaks along these routes. Within these five states and one region, six capital townships and six border townships have been selected. The total catchment population in the five states and one region is estimated at 11.1 million (2015), with about 2.2 million living in the 13 targeted townships including 2.0 million ethnic minorities and 0.7 million living in the six border townships (Appendix 7). The number of poor in 12 townships is estimated at 2.0 million, based on state-wide poverty rates. By targeting border areas, the project is disproportionately targeting the poor.⁶² Within the states/region, the project is not specifically targeting the poor but generally improving surveillance and response, laboratory services, and hospital infection control. Within the selected townships, MEVs in transit, in isolated villages or in labor camps will be targeted for local priority interventions under output 1. Project inputs will be made available to reach these MEVs.

236. In Viet Nam, the project will target 36 out of 64 provinces in Viet Nam. Twenty-five of these 36 provinces are border provinces. Within the 36 provinces, there are 250 focus districts, including 82 border districts and 56 poor districts. Within the project focus area, approximately 23% of the population is from ethnic minorities and some 17% are classified poor. A majority of project resources will be allocated to strengthening disease control and hospital services, and integrating services at district level. These activities will benefit everyone living in the project province. These benefits will further contribute to national and regional improvements. Selected project activities will target high-risk groups, including the poor, to address issues such as CDC among these populations. The project will specifically help improve health coverage for MEV. MEV frequently have less access to health services, and MEV subgroups maybe at greater risk of infection and developing drug resistance, depending on their location and occupation. The total catchment population in these 36 provinces is estimated at 40 million (2014), with about 20 million living in the 250 districts, a population average of about 80,000 people per district. Proposed spending is approximately \$2 per person in the 36 provinces, with approximately \$8 per person directly focusing on communicable disease control among MEV in border areas.

⁶⁰ Lao Statistics Bureau. 2013 *Lao Expenditure and Consumption Survey 2012/13*. Vientiane

⁶¹ Committee for Planning and Investment National Statistics Center and World Bank. 2004. *Lao People's Democratic Republic Poverty Trends 1992/93- 2002/2003*. 2004

⁶² IMNPED, UNDP. 2015. *Integrated Household Living Conditions Assessment 2009-2010*

237. **Financing Health Care.** Project countries have experienced high rates of GDP growth in the past decade, but at the same time the populations face rising prices and increased income inequity. Funding gaps in the health sector along with high investment in advanced technology and hospitals have led to high out-of-pocket (OOP) spending, and deficits in investment for both urban and rural basic health services. In addition, several important bilateral partners have scaled down their inputs or left the sub-region. There is a general need for sector investment, especially for prevention and public goods.

238. Myanmar remains one of the poorest countries in Southeast Asia despite an average rate of GDP growth in recent years estimated near 8.7%. Current GDP per capita is \$1190. Between 2005 and 2010 Myanmar reduced poverty incidence from 29.6% to 22.7%, or by 5.2% annually. Nearly 70% of the population live close to the \$2/day poverty line and most households are likely to face serious problems accessing even the most basic and critical services. Infant mortality and under-five mortality rates per thousand live births were 60 and 78, respectively, and maternal mortality ratio (MMR) was 255 per 100 000 live births for the whole country. Government health expenditures in Myanmar 2014 were \$540 million, or \$10 per capita, This represented only 0.9% of GDP in 2014. OOP spending by private households remains the main source for financing health care in the country.

239. Viet Nam poverty rates decreased from around 58% in 1993 to 16% in 2006, and extreme poverty rates were 25% and 6%. The recent average rate of GDP growth has been 6.0% per annum. Current GDP per capita is \$1,974. Poverty reduction programs and economic growth have reduced national poverty levels from 2006 to 4.1% in urban areas and 13.6% in rural areas. In 2006, the poverty rate for ethnic minority groups was more than five times that of ethnic majority groups. Viet Nam has policies regarding health care for vulnerable groups to ensure equity and accessibility. It has done reasonably well in terms of average levels of health, but less well in terms of addressing health inequalities. Infant mortality has fallen fastest in the richer southern regions and least quickly in its poorer northern regions. Inequalities across wealth groups also have widened. Government health expenditures in 2014 were \$6.12 billion, or \$64.9 per capita. This represented 3.3% of GDP in 2014. The transition from a health system in which the Vietnamese government provided free health care to a system increasingly relying on OOP expenditures at the point of treatment has resulted in financial barriers that prevent the poor and near poor from accessing health care.

240. Laos has achieved high growth rates the since the introduction of economic reforms in the mid-1980s, resulting in a steady decline in poverty. The recent average rate of GDP growth is 7.6% per annum. Current GDP per capita⁶³ is \$1,695. Poverty is concentrated in mountainous regions where most of the country's ethnic minorities live. While the incidence of absolute poverty has been halved, inequality increased. Life expectancy remains low overall at 59 years, and mortality and morbidity rates are very high in mountainous areas where poverty is severe. Government health expenditures in 2014 were \$166 million, or \$24.1 per capita. This represented 1.4% of GDP in 2014. Overall subsidies are concentrated at provincial and central level hospitals, favoring urban residents. The poorest quintile benefited from less than 5% of total government expenditure on health services, versus 30% for the richest quintile.

241. Cambodia is considered a success story in poverty reduction among the GMS project countries. Average rate of recent GDP growth is 7.1% per annum. Current GDP per capita is \$1,063. The growth has been pro-poor. The poverty rate fell sharply from 47.8% in 2007 to 18.9% in 2012. However, children in the poorest quintile are three times more likely to die

⁶³ Local currency using average exchange rate (ADB data).

before their fifth birthday than those in the richest quintile. Government health expenditures in 2014 were \$207 million, or \$13.1 per capita. This represented 1.2% of GDP in 2014. Donors and NGOs accounted for US\$209.0 million in 2012. Catastrophic health expenditures averaged almost 5% in 2004 but fell to 2.8% in 2011. An estimated two-thirds of the poor are covered geographically, and the government has committed to national coverage.

242. **Economic Rationale.** This is a regional project focusing on infectious disease control, including emerging and re-emerging diseases of regional relevance that are underfunded. Infectious diseases disproportionately affect the poor and are still responsible for between a quarter and a third of all deaths and disability in the four project countries. Benefits can include productivity gains, savings on medical services, reducing the spread of diseases, avoiding disruption of economic activity, reduced public anxiety, and maintaining business confidence. The economic analysis focuses on saving on medical services directly and through prevention.

243. The project addresses market failures in terms of regional public goods, externalities, and gaps in services for the poor. Demand for these preventive services is lower than desired, making it less attractive for the private sector unless publicly subsidized. Public goods with externalities include public education, surveillance and response, diagnoses, and hospital hygiene.

244. Private participation in the provision of health services in rural areas is suboptimal. The gaps in quality rural health services justify continued government intervention. There are no regulatory barriers that prevent more qualified providers from entering the rural market but there is limited interest for economic and social reasons. Rather than crowding out private services, the project is more likely to improve the entrance and quality of private services in rural areas. Contracting out also requires considerable administrative and monitoring capacity. The Government of Cambodia attempted public-private partnerships by contracting out health services to international NGOs but found the costs to be relatively high, and is now using a form of contracting out within the public sector.

245. Global financing to fight communicable diseases is not always aligned with the disease priorities of developing countries, and since donors tend to imitate each other's funding decisions, the real needs of developing countries may be overlooked. Applying the concept of global public good to health funding decisions reprioritizes financing for communicable diseases.

246. In an earlier project (CDC2), external funding was found to supplement government funding and other external aid, rather than free up government funding. The project would increase sector allocations for preventive services, which are associated with higher cost-benefit. In addition, the project targets remote border districts where the economic returns on investment are likely to be much higher despite higher unit costs for service delivery.

247. Monitoring and appropriate incentives are needed to ensure that project inputs achieve their intended results. This depends on a wide range of supply and demand issues and is of particular concern in the health system. All four countries face chronic funding, staff, and operational problems, especially for preventive services in rural areas. As far as financially possible, the four countries are making long-term adjustments in the form of pay rises and incentives for posting to rural areas, to offset social, transport, and opportunity costs.

248. Calculating health benefits of each project activity, in disability adjusted life years (DALY) gained, there is a net positive economic gain from the GMS-HS Project one year after the five

years of ADB total investment of \$133.65 million. After four more years, it will have generated net benefits having a Net Present Value (at the ADB standard 12% discount rate) of \$31.12 million. Under these assumptions, the EIRR after 10 years is calculated as 23.4% for all four countries combined. A period of ten years was used to calculate Net Present Values (NPV) because, as was assumed for the prior CDC projects, the effects of the Project are expected to be measurable for five years following the five year implementation period. The EIRR varies between countries, as shown in Table 14.

Table 14: Economic Internal Rate of Return (EIRR) of the Project

	Myanmar	Vietnam	Laos	Cambodia	CLMV countries
Economic internal rate of return	60.6%	19.4%	39.0%	5.8%	23.4%

Source: PPTA

249. Table 15 shows that recurrent cost financing is a negligible percentage of government health expenditure (GHE) in Myanmar (0.03%), Viet Nam (0.015%), Laos (0.227%), and Cambodia (0.205%). Furthermore, in three of the four countries, government health expenditures are a very low percentage of GDP, meaning that there is headroom for expanding GHE.

Table 15: Projected Health Recurrent Cost Financing (2017-2025)

Indicator	Myanmar	Vietnam	Laos	Cambodia
Average projected GHE (\$ million) 2017-2022	708	8035	218	271
GHE/GDP 2010-2014 average	0.7%	2.9%	1.3%	1.3%
Total project cost 2017-2022	\$14.2	\$84.1	\$12.6	\$25.4
Average project annual recurrent cost 2017-2022 (\$ million)	\$1.04	\$5.72	\$2.41	\$2.72
Project recurrent cost as % of country total HS-GMS	7.3%	6.8%	19.1%	10.7%
Project recurrent cost as % of GHE	0.030%	0.015%	0.227%	0.205%

Source: PPTA

250. **Project Feasibility.** Project performance depends on a number of features that need to be considered in project design:

- (i) **Capacity of the executing agency.** MOH Cambodia, Laos and Viet Nam have extensive experience with ADB projects. MOH Myanmar has limited exposure to ADB projects but has long standing administrative experience and a well-organized health system which is however somewhat outdated.
- (ii) **Coordination.** Interdepartmental, multi-sectoral, program, and aid coordination is in place in all countries but can be improved. Major targeted programs work quite independently. Coordination mechanism needs to be set up.
- (iii) **Program approach.** All MOH are committed to IHR/APSED which provides a comprehensive framework for addressing public health security program.
- (iv) **Annual Planning Cycle.** All MOH have a bottom up annual planning and budgeting cycle that needs to include project activities.
- (v) **Human resource constraints.** All executing agencies have serious human resources constraints. Senior officers have multiple responsibilities. Although project management units (PMUs) risk stand-alone projects, all EAs will use a PMU to facilitate implementation. At provincial/state level, health offices will

- represent the EA. Proper arrangements need to be put in place to ensure participatory planning and accountability.
- (vi) **Project implementation.** The main feasibility concern is that the project does not reach MEVs including poor ethnic minorities and migrants in border areas, or that implementation of this investment is less efficiency. Governments face constraints in outreach services that may warrant contracting out of services.
 - (vii) **Gender and Safeguard.** Gender and Safeguards were examined. The main concern is that benefits for MEVs are not realized due to implementation constraints.
 - (viii) **Procurement.** Procurement capacity is limited in Myanmar and in the provinces in the **three other countries. Central procurement is proposed.**
 - (ix) **Financial management.** Myanmar MOH is not familiar with handling foreign investment projects in general and ADB financial management.

251. **Gender, Social Analysis, and Risks.** A gender analysis, social safeguards analysis and procurement and financial risks analysis were conducted and are reported separately.

252. The proposed project's gender categorization is "effective gender mainstreaming." A gender strategy and action plan has been prepared and a gender expert is to be engaged. Among others, active engagement of women's organizations is proposed to mobilize communities and reach at risk groups.

253. Ethnic minorities in the proposed project areas will be positively affected given the type of project activities. The proposed project is initially categorized B for indigenous people because of the risk that intended project benefits for MEVs are not realized. A Chief Technical Advisor will be engaged in each country to help mitigate this risk.

254. The proposed project is initially categorized as B for environment, as it involves improving laboratory and hospital waste management. Each province will need to prepare an environmental management plan.

255. The project will not entail land acquisition. The proposed project is initially categorized C for involuntary resettlement. A resettlement framework has been prepared in case there is any change of scope.

256. There are three technical risks: (i) the large number of targeted provinces (36) and targeted districts (250); (ii) insufficient progress in regional cooperation; and (iii) the risk of insufficient focus on MEVs. The project performance will to a large extent depend on the capacity of the PMUs.

257. Financial management assessments (FMAs) were conducted in early 2016 in accordance with ADB's *Guidelines for the Financial Management and Analysis of Projects and the Financial Due Diligence: A Methodology Note*. The FMA concluded that the financial management risk was moderate except for Myanmar, which was high. Hence, financial risk management plans were prepared. To ensure that loan proceeds are disbursed in accordance with ADB's *Loan Disbursement Handbook*, online training for project staff on disbursement policies and procedures is recommended.⁶⁴

⁶⁴ Disbursement eLearning. http://wpqr4.adb.org/disbursement_elearning

258. The procurement risk assessments concluded that procurement risk was moderate except in Myanmar, which was high. Provinces lack capacity for procurement of laboratory equipment. Accordingly, all major procurement should be done centrally. Provinces will do the repairs of facilities from their own sources, as counterpart contribution, and procure their own laboratory supplies and reagents. International consulting services to mitigate these risks will need to include laboratory and procurement experts.

259. Overall, the proposed project is considered to be low-risk in terms of (i) technical investments; (ii) safeguard categorization B or C; and (iii) participation of provinces/states/region and partners. Administrative risk is considered modest in view of MOH staff constraints.

IX. CONCLUSIONS AND RECOMMENDATIONS

a. Conclusions

260. Southeast Asia is an epicenter of EIDs and other diseases and drug resistance of regional significance with potentially major health, economic, and poverty impact. Regional cooperation is required for communicable diseases that rapidly spread across borders. Countries in the GMS are committed to build resilient national health systems and strengthen regional cooperation based on IHR and APSED.⁶⁵ Regional cooperation can also have benefits in terms of control of other infection diseases of regional significance such as HTM and dengue, and leverage national control efforts.

261. Collecting information from government, field visits and partners, the consultant estimated that, in CLMV countries, about 66% of IHR core capacities are in place. There are multiple access, human resource, technical, and financial constraints. The HTM programs are better resourced but also fall short of covering MEVs. It should be kept in mind that, although the burden of NCDs in adults is high, common infectious diseases cause most mortality among children and the poor in these countries. Efforts to improve high priority public health security and disease control programs will also help reduce this burden, and synergies should be explored and exploited.

262. Country level efforts to improve IHR core capacities with support of WHO have centered around MOH core capacities. Participation of communities, other ministries, private sectors, and other countries appears to be less. In particular, more effort needs to be made in reaching MEVs which may well be the weak link in the surveillance and response system. These MEVs are also more likely to have a higher burden of infections of regional significance. Achieving both public health security and UHC will require reaching these MEVs.

263. This rather long-term regional capacity building scenario is complicated by disturbing new information on regional diseases. Drug resistance may undermine treatment of HTM, not only affecting patient survival, but allowing easier spread of the diseases. More disturbing information comes from the recent EHF outbreak in West Africa, where patients were found to be infective long after their recovery, and continued to harbor the virus in eyes and testis. This implies that people who had EHF can potentially cause a new outbreak much later. This may also be the case for other EIDs. At the same time, there is no national or even global surge capacity for a major epidemic. The implication is that absolute priority should be given to early

⁶⁵ World Health Organization. *International Health Regulations*. 2005. Geneva. WHO South-East Asia Regional Office (SEARO) and Western Pacific Regional Office (WPRO). *Asia Pacific Strategy for Emerging Diseases (APSED)*. 2010. Manila.

identification and investigation of any suspected outbreak at community level using event-based or syndromic reporting, in addition to other measures such as indicator-based surveillance, general hygiene and infection control, screening mobile people, and isolation of suspected cases.

264. ADB is a financing institution with limited staff capacity and works closely with the World Bank on governance and WHO, IOM and other UN agencies on technical matters. ADB brings regional and multisectoral experience, and has been supporting the GMS Economic Development Program and has gained considerable experience with GMS CDC projects in Cambodia, Laos and Viet Nam. ADB has limited experience in the Myanmar health sector.

265. Given these challenges, opportunities, risks, and constraints, the PPTA team carried out sector analysis to identify project priorities for improving regional health security and CDC of regional relevance. Based on the initial project scope, proposed priority areas are regional cooperation and knowledge management, disease control for MEV, broadening and computerizing the surveillance and response network, improving biosafety and quality of laboratory services, and rolling out IPC.

266. In terms of institutional capacity for the proposed project outputs, the surveillance and response units of MOH are capable of managing the surveillance and response elements including regional cooperation, hospital services have programs in place for rolling out IPC, and national referral laboratories are technically competent in improving laboratory services. The general implementation constraint is caused by underperforming public health services, in terms of access, quality and affordability of services, causing low demand and, lacking linkages with community and private providers, gaps in surveillance and response. Linking surveillance and response systems to all providers and communities is a major challenge that can be assisted through computerization and event-based or syndromic reporting.

267. The main project specific constraints is perhaps MOH staff availability. There will be staff constraints in rolling out various programs for surveillance, laboratory, and IPC. Technical challenges in surveillance and response are to engage all communities, integrate and improve surveillance systems, engage the private sector, improve cross-border cooperation, and harmonize information and control strategies in the GMS. Even so, technical implementation should be handled by concerned departments to promote system integration and sustainability.

268. A major project risk is that MEVs are not being reached as the priority target population, in particular ethnic minorities and migrants, given operational constraints. Another project risk is that procured laboratory equipment is not based on needs and capacity of districts, and of poor quality. Procurement and financial management are also considered high risk in view of limited exposure of MOH to standard international practices. A project management unit (PMU) is likely needed to build departmental capacities in various technical and administrative areas.

269. While IHR assumes a basic health system is in place on which to build public health security, the health sector in CLMV countries have been seriously underfunded for major years and are in the process of reform and rebuilding. Health sector financing and human resources have improved substantially in the past 3 years, but governance and financial management reforms are lagging behind. Countries also have physical and sometimes security access problems. Given government service delivery constraints which is tied to government standard, there is a case for contracting out services in hardship areas.

270. In all CLMC countries, IHR/APSED implementation is insufficiently mainstreamed among

departments and sectors as part of broader disaster preparedness. IHR/APSED implementation lacks transparency in terms of status of IHR/APSED implementations, and lacks a comprehensive program approach, combining various action plans of MOH and WHO, that would help promote collaboration, improve know-how, explore synergies, mobilize resources, and address implementation risks.

b. Recommendations

271. The sector analysis supports the proposed project scope as it responds to major health and economic threats, is based on IHR/APSED, supports government priorities, supports MOH policy and plan, supports reaching out to those not being reached as the main concern of public health security and tie to UHC, reflects integration of CDC under one umbrella to improve sector efficiency and effectiveness in anticipation of expected changes in aid funding, and proposes mitigating actions for identified implementation risks.

272. It is recommended that the Project has a strong focus on neglected border areas, meaning those border areas where there are no government or NGOs providing services. The governments may want to explore using district teams to improve outreach in these areas, or contracting out, whatever is most suitable for the local setting. Reaching MEVs will require strong leadership, participatory planning and monitoring, and logistics at district and lower levels.

273. In particular in Myanmar, implementation constraints in ministries need to be addressed. Given staff constraints and financial management and procurement risks, a PMU is proposed in each MOH to facilitate engagement of contractual staff and administrative, technical, and field support. The purpose of the PMUs should be institutional and staff capacity building.

c. Further Work

274. Following preparatory activities are required

- Set up project structure including oversight mechanisms, appoint project staff and establish PMU and imprest account if not done so already. ADB to provide orientation and training for PMU staff.
- Review procurement and financial risk assessment and mitigation plans and make arrangements accordingly.
- Prepare the country project implementation plans by October 2016 so as to include each plan in the MOH annual operational planning and budget cycle for fiscal year 2017.
- Prepare details of project performance monitoring system, as much as possible integrated with current monitoring systems, and collect baseline information
- Initiate a participatory planning process with districts, including mapping of MEVs, to determine specific project activities for MEVs based on local priorities in 2017.
- Based on assessments of IHR/APSED core capacities, prepare detailed plans for strengthening surveillance and response systems and related areas.
- Based on appraisal of laboratory and hospital services, assess detailed plans for improving laboratory services and IPC, assess equipment requirements, and prepare bidding documents.
- In case legislation and SOPs are required such as for regional and cross-border cooperation and laboratory quality assurance and audit, initiated this as early as possible.

- Country gender action plans and ethnic group development plans need to be endorsed by the respective ministries of health, and require adjustment, more detail, or adaptation for local level.
- Each provincial/state/region health office to carry out site specific Initial Environmental Examinations (IEEs) for its health facilities as per ADB policy. MOH will also hold site specific public consultations with potentially affected groups. Each provincial/state/region health office will prepare an environmental management plan (EMP) based on proposed project activities. The EMP will be submitted to MOH and ADB for review and concurrence.

List of appendices

Appendix 1: Problem Tree

Appendix 2: Surveillance and Response Issues and Options in CLMV countries

Appendix 3: Laboratory Services Issues and Options in CLMV countries

Appendix 4: Public Health Security Issues addressed by Proposed Project

Appendix 5: Sector Results Framework

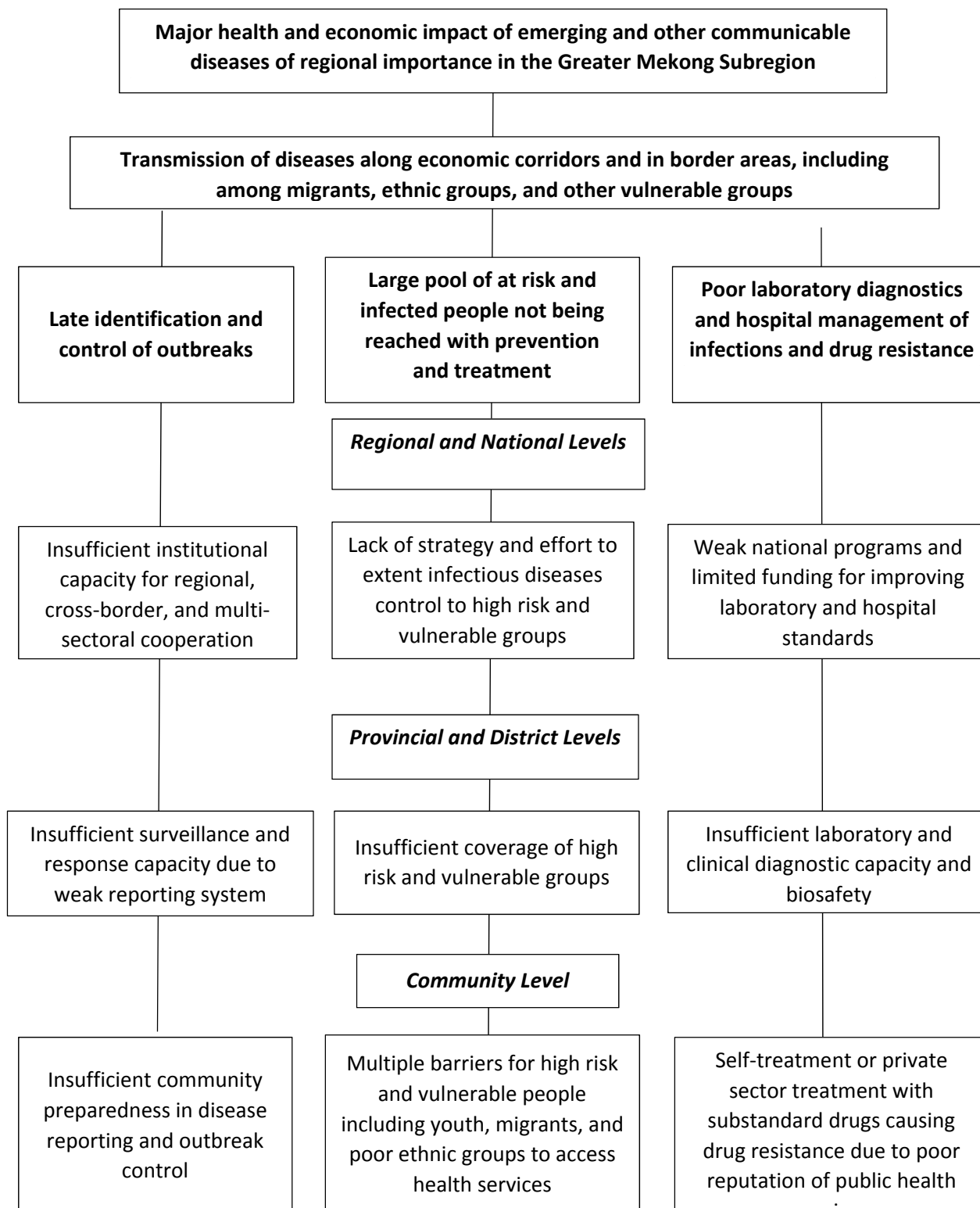
Appendix 6: Major Development Partners

Appendix 7: GMS Health Security Project Target Locations and Populations

Supplementary appendices (separate documents):

- 4 country health situation analyses
- 4 country laboratory analyses

Appendix 1: Problem Tree



Appendix 2: Surveillance and Response Issues and Options in CLMV countries

Area	Function	Issues	Options
Governance	Policies and plans	Partly incomplete legislation and plans	Provide technical assistance to complete plans
	Organization	No strong oversight Lack of authority and autonomy of surveillance and response unit	Revive oversight committee
	Coordination	National Focal Points in place but have many other responsibilities	Assign Deputy as full time deputy NFP, provide more stewardship
	Financing	Insufficient emergency funds	Make emergency funds available in each province
	Aid coordination	Fragmented aid	Develop one program finance by all partners
	IHR/APSED monitoring	Insufficient monitoring	Strengthen IHR/APSED monitoring arrangements
Preparedness, Surveillance and Response	Surveillance	Fragmented surveillance systems, lack of computerization	Improve information technology Ensure information exchange among surveillance systems
	Risk assessment	Limited capacity for risk assessment	WHO training in risk assessment
	Response	Lack of transport to reach outbreak sites Lack of equipment and outdated PPE	Provide vehicles to provinces/districts and motorcycles to health centers Provide equipment and gear
	Risk communication	Insufficient quality of risk communication	Provide technical assistance and training
		Not reaching vulnerable groups including ethnic minorities and migrants	Develop a special program to reach these groups through participatory planning and linking groups with services
	Pandemic preparedness	Insufficient dissemination of preparedness plans	Conduct simulation exercises in all provinces/states
Human Resources Development	Field epidemiology	FETPs are just starting up	Increase scholarships to cover all provinces/states and support national FETPs
		Insufficient district capacity in surveillance and response	Provide 3 months assistant FETP training
Cooperation with other sectors	Ports of entry	Focus on airports	More attention to seaports and land crossings
	Food safety	Lack of diagnostic capacity at central level and in provinces/states	Improve toxicology at central level and microbiology at provincial/state level
		Outdated guidelines and SOPs	WHO to help update list of food additives and other information
		Insufficient dissemination of information	Make standards available on website and provide orientation
	Chemical and	Unclear response	Assign one agency to respond

	radiological hazards	arrangements	and coordinate
		Lack of diagnostic capacity	Provide basic diagnostic equipment and train staff
Laboratory services	CDC diagnoses	(Discussed in another section)	(Discussed in another section)
Services in Border areas	Reaching vulnerable groups		
Cooperation with other countries	Regional cooperation		
	Cross-border cooperation		

Sources: CLMV CDCD/PHD, WHO Country Offices, PPTA assessment.

Appendix 3: Laboratory Services Issues and Options in CLMV countries

Area	Function	Issues	Options
Governance	Legislation, policy and plan	Lack of detail and accountability	Prepare roadmap with indicators
	Cooperation	Weak coordination among partners	Support one agreed program
	Registration, Licensing, Accreditation	Multiple actors High costs	Engage partner and firm to roll out a special program
	Technical leadership	Directors too busy with administration, staff constraints	Engage national champion and WHO technical assistance
	Financing	Shortages of supplies and high out of pocket costs reducing demand	Increase budget, provide free laboratory services for externalities
	Management of laboratories	Weak management skills of officers in charge	Training, monitoring performance, and taking action
	Monitoring	Lack of monitoring laboratory issues and performance	Establish laboratory information system
Biosafety	Facilities	Poor maintenance, inappropriate facilities	Local governments and partners to provide funding for upgrading with technical support
	In-service training	Multiple training by various partners	One program, coordination
	Biosafety procedures	Guidelines, SOPs, manuals, lacking	Provide proper set
	Equipment	Lack of replacement/repair of equipment for hygiene and sterilization	Assessment of lacking equipment, ongoing update of stocks, replacement as needed, close laboratory if not meeting biosafety standards
	Supplies	Lack of reagents, laboratory outfits, micropipettes, other small laboratory ware	Provide these on a sustainable basis, preferably with government funds
Quality	Pre-graduate education	Lack of facilities, supplies, standards of education	Needs comprehensive program for upgrading Urgent need for basic equipment and supplies
	In-service training	Project-driven, ad hoc, narrow training	Establish comprehensive in-service training program supported by all partners
	Specialist education	Lack of pathologists at provincial/state levels	Provide scholarships
	Equipment maintenance and calibration	Lack of repair and maintenance Ad hoc, late calibration	Agree on equipment program, contracting out for major repairs, and train staff in minor maintenance
	Equipment and supplies	Lack of replacement of outdated equipment, oversupply of equipment, inappropriate/poor quality equipment	Agree on equipment program, assess lacking equipment, manage stocks, replace as needed,
	Quality assurance	Lack of QA in most laboratories	Establish QA program with samples from international partner for few diagnostic tests
	Laboratory audit	Lack of national audit system	Establish audit program visiting all laboratories every 1-5 years based on performance
Linkages	With seniors for quality control	Lack of standard laboratory inspection	Use and report based on score card, spot checking
	With clinicians	Clinicians lack understanding of diagnostic tests	Training of clinicians in use and interpretation of laboratory tests

	With surveillance staff	Lack of update of surveillance data based on laboratory test	Update surveillance data based on laboratory diagnoses
	With livestock	Lack of exchange of information	Share information on regular basis
	With immunization services	Poor quality of immunization	Conduct immunization antibody study with research institution
	With research	Unknown infectious agents	Conduct fever study with research institution
Access	Upgrading services	In Cambodia, Laos and Myanmar, most provincial/state laboratories still substandard.	Upgrading middle range provincial laboratories. In Viet Nam, support for integrated district health laboratories
	Expanding services	Lack of quick diagnoses in health centers	Provide rapid diagnostic tests for HIV, TB, dengue, and malaria in addition to microscopy

Source: CLMV National Laboratories, WHO Country Offices, PPTA assessment.

Appendix 4: Public Health Security Issues addressed by Proposed Project

Public health issues	Project activities		
	Output 1	Output 2	Output 3
Geographical targeting	Regional	GMS border provinces/states	
Community targeting	Villages and migrants in border areas		na
IHR/APSED core capacities			
Legislation and Standards	Reporting rule SOPs regional, cross border	Reporting rule SOPs surveillance and response	Guidelines, SOPs for lab and IPC
Coordination	Regional, Cross-borders, Multisectoral	All levels, Multisectoral	Hospitals, Laboratories
Surveillance	Support for syndromic reporting in border villages	Computerization at district level, Syndromic reporting at village level Piloting private sector reporting	Linking labs and surveillance
Response	Support for border villages IEC and outreach when no outbreak response	District response teams and vehicles	Linking lab and response
Risk assessment	Assessing risks of MEVs in border areas	Central level	Linking lab and risk assessment
Risk communication	Regional Border villages Labor camps	All health facilities	Linking IPC, Lab
Community preparedness	Border villages Labor camps	All health facilities	na
Pandemic preparedness	Regional and border villages	Province/state/district	Lab and hospital
Zoonosis	Regional discussion and border villages education	Surveillance and response only	Some lab testing
Port of entry	Possible hotspots for outreach and link to services	Border crossings	Lab and hospital check samples/ cases
Food safety	Education	Integrating surveillance	Microbiology in larger provincial/state labs
Chemical hazards	IEC for industrial workers	Public education and Surveillance	Toxicology supplies at central labs
Radiological hazards	No	Public education and Surveillance	No
Laboratory biosafety	Na	Na	Yes
Laboratory upgrading services	Na	Na	Viet Nam: district labs Cambodia and Lao medium size provincial labs Myanmar: state labs
Laboratory quality/training	Na	Na	Yes
Laboratory QA/audit	Na	Na	Yes
Laboratory management/supplies	na	Na	Yes
Hospital IPC	na	Link to Surveillance	Yes
IPC case management	Referral	Link to Surveillance	Yes
APSED monitoring	Reporting	Reporting	Reporting
CDC programs			
HIV/AIDS	IEC, case finding, linkage to program	No	Testing
TB	IEC, case finding, linkage to program	No	Testing

Malaria	IEC, case finding, linkage to program, vector control	No	Testing
Dengue	IEC, case finding, linkage to program, vector control	No	Testing
NTDs	IEC, Mass drug administration	No	Testing
Childhood Infections/ Immunization	Advocacy, case finding, linkage to program	Surveillance	Study
Other infections like ARI, DD, Typhoid	Outreach Education	Surveillance and Response	Testing
NCD programs	May include some topics	na	Viet Nam only
MNCH/FP program	Birth registration	No	No
Nutrition program	Outreach education	No	no
Occupational health	Outreach migrants	Surveillance	Testing
Environmental health	Outreach village health	No	Testing
School health	Outreach	Surveillance	Testing
Human resources/Quality of care	Health workers	Surveillance and Response staff, FETP, assistant FETP	Scholarships IPC, lab training
Planning and financing	Include outreach in AOP and budget	Include syndromic reporting and outbreak funds in AOP and budget	Include supplies, training and QA/audit in AOP and budget
Governance and management	Get support for outreach program for MEV, SOPs and budget financing for regional coordination	Get support for domestic financing of surveillance and response	Get support for systematic roll out of lab improvement and IPC and inclusions of financing in budget
Management information system	Linkages	Linkages	Linkages

Appendix 5: Sector Results Framework

GMS Health Security Sector Outcomes		GMS Health Security Outputs		ADB GMS Health Sector Operations	
Impact/Outcomes with ADB Contribution	Indicators with Targets & Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Contributions
<p>Impact by 2025: GMS public health security enhanced</p> <p>Outcome by 2020: GMS Health Security System achieved IHR/APSED standards</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas accessed services for CDC</p>	<p>Impact indicators Zero major outbreaks of emerging or other epidemic disease in excess of 100 fatalities</p> <p>Outbreaks have less than 0.5% impact on GDP in any quarter of the year</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas receiving treatment for HIV and TB doubled</p> <p>Outcome indicators IHR/APSED compliance increases from 70% to 90% average</p> <p>Coverage of disease control interventions in MEVs increases from 60% to 80% average</p>	<p>Enhanced GMS collaboration and CDC in border areas by 2020:</p> <p>Strengthened national surveillance and response system by 2020</p> <p>Improved diagnostic and management capacity of infectious diseases by 2020:</p>	<p>GMS countries report all suspected cases of notifiable communicable within 24 hrs. (from zero)</p> <p>Each province conducts cross border and intersectoral disease control activities</p> <p>MEVs reached with CDC programs doubled by 2020</p> <p>By 2020, all targeted public hospitals conduct web-based reporting of notifiable diseases within 12 hrs. and case investigation within 24 hrs. compared to 80% in 2014</p> <p>Targeted laboratories meeting national quality and biosafety standards increases from 30% to 60%</p> <p>Targeted hospitals meeting 60% of IPC and case management standards increased from 30% to 80%</p>	<p>Planned key activity areas: GMS Health Security Project \$125 million:</p> <p>Cambodia \$21.0 million ADF loan;</p> <p>Laos \$8 million grant and \$4 million ADF loan</p> <p>Myanmar \$12.0 million ADF loan</p> <p>Viet Nam \$80.0 million ADF loan</p> <p>ADB Projects in the pipeline with estimated amounts: tbd</p> <p>Ongoing ADB projects with approved amounts: Second GMS CDC Project \$63.5 million</p> <p>Strengthening HIV Prevention Capacity in the GMS Project \$20.3 million</p> <p>Regional Capacity Building TA for Malaria Elimination and CDC capacity building Project \$17.2 million</p>	<p>Planned key activity areas: Regional, cross-border and intersectoral collaboration for CDC among all GMS countries; including joint planning to reach MEVs;</p> <p>outreach program to link MEVs with CDC program</p> <p>Web-based surveillance system including community syndromic reporting, and rapid outbreak response</p> <p>Laboratories with better biosafety and quality of diagnostic tests</p> <p>Hospital with better infection prevention and control and case management of infectious diseases</p> <p>Planned projects: tbd</p> <p>Ongoing projects: HIV prevention Malaria control</p>

Source: ADB.

CDC = Communicable Diseases Control; GMS = Greater Mekong Subregion; HTM = HIV/AIDS, Tuberculosis and Malaria; tbd = to be determined

Appendix 6: Major Development Partners

Development Partner	Project Name	Duration	Amount (\$ million)
REGIONAL			
ADB, DFAD, DfID	Second GMS Communicable Diseases Control Project Extension – Regional Part	2015-2017	5.0
ADB, DFAD, DfID	Regional Capacity Building Technical Assistance for Malaria Elimination and CDC	2016-2017	12.0
CAMBODIA			
ADB, DFAD, DfID	Second GMS Communicable Diseases Control Project and Extension	2010 – 2017	14.0
USAID, others	Global Health Security Agenda	2016 –	tbd
AFD, BTC, DfID, DfID, UNFPA, UNICEF, World Bank	Health Sector Support Program Phase II	2009 – 2015	149.8
DFAT, Korea, World Bank	Health Sector Support Program Phase III	2016 – 2020	
WHO	Systems Strengthening Program/Support for Health Sector Reform		
LAOS			
ADB, DFAD, DfID	Second GMS Communicable Diseases Control Project and Extension	2010 – 2017	15.0
ADB	Strengthening HIV/AIDS Prevention Capacity in the GMS	2012 – 2018	5.0
GF	Malaria, TB, HIV/AIDS control projects	2016 – 2017	25.2
USAID, others	Global Health Security Agenda	2016 –	tbd
ADB	Health Sector Support Program	2010 – 2015	
ADB	Health Sector Governance Program	2015 – 2020	23.0
EU/UNICEF	Multisector Nutrition Support Program in the Laos	2016 – 2020	55.5
EU	Regional Networking of Laboratories in the Laos to Control Transboundary Emerging Infectious Diseases in South East Asia	2011 – 2015	3.0
EU	Development of a Laos-Cambodia One Health Surveillance and Laboratory Network	2014 – 2018	2.0
GAVI	Health Systems Strengthening Project	2016 – 2020	7.8
GF	Health Systems Strengthening Program	2016 – 2017	3.7
JICA	Project for Improving Quality of Health Care Service	2015 – 2020	4.3
KOICA	Integrated MNCH and Pediatric Education	2013 – 2017	8.7
KOICA	Health Professional Training, Education Development Centre, University of Health Sciences	2015 – 2020	5.0
Lux Development	Lao-Luxembourg Health Sector Support Programme Phase II	2014 – 2020	25.5
USAID	Improving Nutrition and Community Sanitation	2015 – 2017	5.9
World Bank	Health System Development and Reform	2006 – 2015	27.4
World Bank	Health Governance and Nutrition Development Project	2015 – 2020	26.4
WHO	Systems Strengthening Program/Support for Health Sector Reform	2015 – 2020	15.0
MYANMAR			
ADB, DFAD, DfID	Malaria and CDC Project in the GMS including regional support	2016 – 2017	5.2
ADB, JFPR	Strengthening HIV Prevention Capacity in the GMS	2015 2018	10.0
GAVI	MNCH program		
GFATM	Malaria, TB, HIV/AIDS control projects	2016 – 2017	
USAID/others	Global Health Security Agenda	2016 –	tbd
WHO	WHO Program for Health Systems Strengthening and CDC		
World Bank		2015 –	100.0
VIETNAM			
ADB, DFAT, DfID	Second GMS CDC Project and Extension	2010 – 2017	29.5
ADB	Strengthening HIV/AIDS Prevention Capacity in the GMS	2012– 2018	15.3
ADB	Food Safety Management Capacity Support Project in the GMS and Trade Expansion in the Mekong Sub-region	2013 – 2018	11.0
GAVI	Pentavalent Vaccine Support	2010 – 2015	72.7
GFATM	The Global Fund supported project on HIV/AIDS	2008 – 2015	181.5
GFATM	Scaling Up TB Control in Viet Nam round 9	2011 – 2015	57.2

GFATM	Regional Initiative to Prevent Artemisinin-Resistant Malaria	2014 – 2016	15.0
JICA	Capacity Development for Laboratory Network of Biosafety and Examination of highly Hazardous Infectious Pathogens	2011 – 2016	3.7
JICA	Research and Building Surveillance of Antibiotic Resistant Bacteria	2014 – 2018	6.7
JICA	Strengthening Capacity for Measles-Rubella combined vaccine production	2014 – 2018	
JICA	Project “Determine the Outbreak Mechanism and Development of a Surveillance Model for Multi-Drug Resistant Bacteria	2014 – 2018	3.2
USA	HIV/AIDS Prevention and Control Program	2014 – 2015	170.0
USAID	Support to the National Tuberculosis Program	2010 – 2015	11.3
USAID/others	Global Health Security Agenda	2016 –	tbd
WHO	Cooperation with the World Health Organization	2014 – 2015	18.5
ADB	Health Care in the South Central Coast Project	2008 – 2015	60.0
ADB	Health Human Resources Development Program	2010 – 2016	76.3
ADB	Second Health Care in the Central Highlands	2014 – 2019	50.0
China	Construction of the Hanoi University of Pharmacy	2013 – 2017	45.0
EU	Health Support Program	2009 – 2015	29.9
GAVI	Health Systems Strengthening Project Phase 2	2012 – 2015	24.4
GIZ	Strengthening Provincial Health Systems Phase II	2009 – 2015	12.2
GFATM	Strengthening Health Systems for ATM and MCH Programs	2012 – 2016	86.9
Korea	Building Hanoi Medical University into a national target university towards regional standards by 2020.		45.0
JICA	Development of provincial hospitals, Phase II	2011 – 2016	104,2
World Bank	Central North Region Health Support Project	2010 – 2016	65.0
World Bank	Health Professional Education and Training for Health System Reform	2014 – 2020	116.0
World Bank	North-East and Red River Delta Regions Health System Support Project	2013 – 2019	150.0
World Bank	Hospital Waste Management Support Project	2011 – 2017	150.0

Appendix 7: GMS Health Security Project Target Locations and Populations
Table 1: Overall Project Location of Project Activities

Target/Output	Cambodia	Laos	Myanmar	Viet Nam
A. Overall Project Locations				
Provinces/ states/ region	13	12	6	36
Border provinces /states/region	12	11	6	25
Districts/ODA	40	55	30	360
Border districts	23	36	6	82
Poor districts	11	na	na	56
Targeted districts	40	36	12	300
Provincial hospitals	12	12	6	36
District hospitals	44	55	30	360
Health centers/CHS	507/65	xx	xx	xx
Provincial/state/ region population	7,616,783	3,000,000	11,100,000	40,000,000
Targeted district population	3,600,000 (+Kandal?)	1,434,267	2,196,930	20,080,038
Border district population	3,600,000	750,000?	700,000	13,120,000
Ethnic in provinces	3,700,000	1,000,000	2,000,000	9,200,000
Poor in provinces	1,500,000	400,000	2,000,000	6,800,000
B. Location by Intervention				
Cooperation				
Regional cooperation	+	+	+	+
Cross border cooperation	+	+	+	+
Intersectoral cooperation	+	+	+	+
Regional workshops	+	+	+	+
Project workshops, steering committee	+	+	+	+
Regional cooperation unit	--	--	--	--
CDC in border areas				
CDC assessment and planning for vulnerable groups in border areas	+	+	+	+
Targeted disease control				
HIV/AIDS	migrants	migrants	migrants	migrants
TB	Migrants, diagnoses GenExpert	migrants	migrants	migrants
Malaria	Forest workers	Forest workers	Forest workers	Forest workers
Dengue	Border towns	Border town	Border towns	Border towns
NTDs MDA	--	12 provinces	--	--
Immunization	--	Phongsaly	--	--
School ethnic minorities	+	+	+	+
Model healthy village	--	--	--	--
Vector control	--	--	--	--
Surveillance				
Information technology	Province and district	Province and district	State/region and district	Province and district
Surveillance	Training	Training	Training	Training
FETP, A-FETP risk analysis	+	+	+	+
Syndromic reporting	+	+	+	+

Response	District vehicles	Provincial vehicle	District vehicle	District vehicle
Outbreak response fund	+	+	+	--
APSED evaluation	--	+	--	--
Community preparedness	+	+	+	+
Quarantine services	+	+	+	+
Laboratory				
Lab planning and management	+	+	+	+
Quality assurance	+	+	+	+
Audit	+	+	+	+
Pre-service training	+	+	+	+
Quality improvement	+	+	+	+
Lab studies	+	+	+	+
Provincial equipment	+	+	+	+
District equipment	+	+	+	+
Transport system	--	--	--	--
Maintenance system	--	--	--	--
Lab information system	--	--	--	--
IPC in hospitals				
Training	Nurses, doctors, others	nurses, doctors, others	Nurses, doctors, others	Nurses, doctors, others
Scholarships	nurses	nurses	nurses	Nurses
Equipment/repair	Hygiene facilities	Hygiene facilities	Hygiene facilities	hygiene facilities
EID case management	Provincial hospitals	Provincial hospitals	State/region hospitals	Provincial hospitals
Training	+	+	+	+
Equipment/repair	hygiene	hygiene	hygiene	Hygiene

Source: PPTA

Table 2: Cambodia Project Location Details

No Provinces	Provinces	No Districts	Districts	Population	Border district	Ethnic	Poor (%)
1	Banteay Meanchey	1	Mongkol Borei	247,530		1	25.5
		2	Poipet	206,423	1	2	
		3	Preah Net Preah	156,538		3	
		4	Thma Puok	136,280	2	4	
2	Battambang	5	Thmar Koul	231,168		5	24.8
		6	Maung Russei	205,902		6	
		7	Sampov Luon	162,472	3	7	
		8	Battambang	372,440	4	8	
		9	Sangkae	204,546		9	
3	Kampot	10	Angkor Chey	123,253			20.4
		11	Chhouk	187,332			
		12	Kampong Trach	172,433	5		
		13	Kampot	146,365			
4	Kandal	14	Takhmao	209,254			14.6
		15	Saang	175,474			
		16	Koh Thom	177,733	6		
		17	Kien svay	118,457			
		18	Leuk dek	61,559	7		
		19	Muk kampoul	71,053			
		20	Lvea Em	99,465			
		21	Khsach kandal	282,966			
		22	Ponhea leu	98,657			
23	Ang snoul	170,747					
5	Kratie	24	Chhlong	107,617		10	32.6
		25	Kratie	263,299	8	11	
6	Mondulkiri	26	Sen Monorom	73,702 73,702	9	12	32.9
7	Pailin	27	Pailin	67,565 67,565	21		23.9
8	Preah Vihear	28	Tbeng Meanchey	208,953 208,953	10	13	37.0

9	Prey Veng	29	Kamchay Mear	1,181,098 140,476	11		21.9
		30	Kampong Trabek	146,180	12		
		31	Mesang	122,687			
		32	Neak Loeng	129,378	13		
		33	Pearaing	117,840			
		34	Preah Sdach	119,775	14		
		35	Svay Antor	153,216			
		36	Sithor Kandal	75,150			
		37	Krong Prey Veng	81,367			
		38	Baphnom	95,029			
10	Ratanakiri	39	Banlong	187,005 129,053		14	36.2
		40	Borkeo	57,952	15	15	
11	Stung Treng	41	Steung Treng	133,408 133,408	16	16	36.8
12	Svay Rieng	42	Chi Phu	599,119 103,889	17		17.4
		43	Romeas Hek	142,088	18		
		44	Svay Rieng	221,890	19		
		45	Svay Teap	131,252	20		
13	Tbong Khmum	46	Kroch Chhmar	91,415		8	20.4*
		47	Memut	137,015	22	9	
		48	O Reang Ov	92,186		10	
		49	Ponhea Krek	216,436	23	11	
		50	Tbong Khmum	239,918		12	
	TOTAL			7,616,783	3,582,598	3,674,253	

Sources: Ministry of Health, Department of Planning and Health Information (DPHI) 2016; Ministry of Planning and United Nations Development Programme, 2012. *Poverty Reduction by Capital, Provinces, Municipalities, Districts, Khans, and Communes and Sangkats Based on Commune Database 2004-2012*, Phnom Penh: MOP Based on the Commune Database 2004-2012.

*Data for Kampong Cham province from which Tbong Khmum province was split

Table 3: Lao Project Locations Details

No. Province	Province Name	No District	District Name	No Villages	Total Population	Border	% Ethnic
1	Phongsaly	1	Phongsaly	82	37,408	China	95%
		2	May	78	23,596	Vietnam	99%
		3	Samphanh	78	26,877	Vietnam	95%
		4	Boon neua	70	18,952	China	91%
		5	Nhot ou	91	27,177	China	98%
		6	Boontai	57	16,619	China	97%
2	Luangnamtha	7	Namtha	69	44,584	China	85%
		8	Sing	85	30,790	China	85%
		9	Long	75	28,705	Myanmar	80%
3	Oudomxay	10	Xay	89	68,726	China	75%
		11	Namor	68	34,833	China	95%
4	Bokeo	12	Huoixai	98	68,380	Myanmar	65%
		13	Tonpheung	51	27,186	Myanmar	70%
		14	Meung	23	13,287	Thailand	65%
		15	Paktha	47	20,254	Thailand	75%
5	Huaphanh	16	Xiengkhor	58	29,115	Vietnam	68%
		17	Viengthong	65	26,392	Vietnam	64%
		18	Viengxay	113	35,741	Vietnam	72%
		19	Huameuang	74	30,820	Vietnam	54%
		20	Xamtay	145	57,901	Vietnam	59%
		21	Sopbao	58	27,735	Vietnam	74%
22	Add	65	27,324	Vietnam	67%		
6	Xiengkhuang	23	Nonghed	85	39,432	Vietnam	45%
		24	Morkmay	27	13,458	Vietnam	52%
7	Borikhamxay	25	Xaychamphone	38	37,401	Vietnam	34%
		26	Khamkheuth	75	66,403	Vietnam	41%
		27	Viengthong	41	31,573	Vietnam	38%
8	Khammuane	28	Bualapha	56	30,219	Vietnam	29%
		29	Nakai	38	27,845	Vietnam	59%
9	Saravane	30	Ta Oi	44	34,208	Vietnam	87%
		31	Toomlarn	53	32,272	Thailand	65%
		32	Samuoi	44	20,250	Vietnam	92%
10	Sekong	33	Kaleum	37	19,169	Vietnam	87%
		34	Dakcheung	65	29,413	Vietnam	85%
11	Champasack	35	Paksxong	65	71,045	Thailand	73%
		36	Pathoomphone	63	57,170	Cambodia	65%
		37	Moonlapamok	45	47,125	Cambodia	43%
		38	Khong	79	85,319	Cambodia	42%
12	Attapeu	39	Sanamxay	36	32,649	Vietnam	75%
		40	Sanxay	34	22,194	Cambodia	68%
		41	Phouvong	23	14,720	Vietnam & Cambodia	43%
12		41		2587	1,434,267	All border districts	959,410 (67%)

Table 4: Myanmar Project Location Details

No State/Region	State/Region	No Townships	Project town	Population	Border	Ethnic
1	Shan State North			2,278,374		
		1	Lashio	323,405		323,405
		2	Muse	117,507	117,507	117,507
2	Shan State East			1,140,075		
		3	Keng Tong	171,620		171,620
		4	Tachileik	148,021	148,021	148,021
3	Kayah State			286,627		
		5	Loikaw	128,401		128,401
		6	Mese	63,190	63,190	63,190
4	Kayin State			1,574,079		
		7	Hpa An	421,575		421,575
		8	Myawaddy	195,624	195,624	195,624
5	Mon State			2,054,393		
		9	Mawlamyaing	289,388		289,388
		10	Ye	152,485	152,485	152,485
6	Tanintharyi Region			1,408,401		
		11	Dawei	125,605		
		12	Kawthaung	116,980	116,980	
Total	11,147,932			2,196,930 (19%)	736,936 (34%)	1,954,345 (89)

Source: The 2014 Myanmar Population and Housing Census - The Union Report, May 2015 (web)

Table 5: Viet Nam Project Location Details

	Province /Districts	#	District	Total CHS	Population	Border district	Ethnic	Poor district	% poor (2012)
1	Bac Kan						86.70		23.53
		1	Ba Bể	16	46,350			1	
		2	Bạch Thông	17	30,216				
		3	Chợ Mới	16	36,747				
		4	Chợ Đồn	22	48,122				
		5	Na Rì	22	36,000				
		6	Ngân Sơn	11	27,680				
		7	Pác Nặm	10	26,131			1	
2	Cao Bằng						95.32		32.98
		1	Bảo Lâm	14	55,936	1		1	
		2	Bảo Lạc	17	49,362	1		1	
		3	Hà Quảng	19	33,261	1		1	
		4	Hòa An	21	63,515				
		5	Hạ Lang	14	25,294	1		1	
		6	Nguyễn Bình	20	39,420				
		7	Phục Hòa	9	22,501	1			
		8	Quảng Uyên	17	39,572				
		9	Thông Nông	13	22,223	1		1	
		10	Thạch An	16	30,563	1			
		11	Trà Lĩnh	10	21,558	1			
		12	Trùng Khánh	20	48,713	1			
3	Điện Biên						80.00		45.28
		1	Dien Bien	25	106,313				
		2	Mường Chà	12	52,080	1			
		3	Mường Nhé	11	32,977	1		1	
		4	Mường Ảng	10	47,279			1	
		5	Tuần Giáo	19	74,031				
		6	Tủa Chùa	12	47,279			1	
		7	Điện Biên Đông	14	48,990			1	
		8	Nậm Pồ	15	43,542	1			

4	Hà Giang						87.90		35.38
		1	Bắc Mê	13	47,339				
		2	Bắc Quang	23	45,286				
		3	Hoàng Su Phì	25	59,427				
		4	Mèo Vạc	19	40.28	1			
		5	Quang Bình	15	56,824				
		6	Vị Xuyên	24	95,725	1			
		7	Xín Mần	20	31.53	1			
		8	Yên Minh	19	77,625	1			
		9	Đông Văn	20	64,757	1			
		10	Quản Bạ	13	44,506	1			
5	Hòa Bình				832,543		72.27		26.09
		1	Lạc Sơn	29	132,337				
		2	Mai Châu	23	55,663				
		3	Đà Bắc	20	52,381				
6	Lai Châu						79.14		38.88
		1	Mường Tè	13	39,921	1		1	
		2	Phong Thổ	18	66,372	1		1	
		3	Sìn Hồ	22	74,703	1		1	
		4	Tam Đường	14	46,767				
		5	Than Uyên	12	57,837			1	
		6	Tân Uyên	10	58,439			1	
		7	Nậm Nhùn	11	24,165	1			
7	Lạng Sơn						83.50		24.81
		1	Bình Gia	20	52,087				
		2	Bắc Sơn	20	65,836				
		3	Cao Lộc	23	73,516	1			
		4	Chi Lăng	21	73,887				
		5	Hữu Lũng	26	112,451				
		6	Lộc Bình	29	78,324	1			
		7	Tràng Định	28	58,441	1			
		8	Văn Lãng	20	50,210	1			
		9	Văn Quan	24	54,068				
		10	Đình Lập	12	26,429	1			

8	Lào Cai					1	66.88		35.29
		1	Bát Xát	23	70,015	1			
		2	Bào Thắng	15	99,974				
		3	Bảo Yên	18	76,415	1			
		4	Bắc Hà	21	53,587			1	
		5	Mường Khương	16	51,993	1		1	
		6	Sa Pa	18	53,549				
		7	Si Ma Cai	13	31,323	1		1	
		8	Văn Bàn	23	79,220				
9	Quảng Ninh						12.53		4.89
		1	Bình Liêu	9	27,629	1			
		2	Hải Hà	20	52,729	1			
		3	Tiên Yên	12	44,352				
		4	Đầm Hà	10	33,219				
10	Sơn La						82.58		31.35
		1	Bắc Yên	16	56,796			1	
		2	Mai Sơn	23	137,341	1			
		3	Mường La	16	91,377			1	
		4	Mộc Châu	15	104,730	1			
		5	Phù Yên	27	106,892			1	
		6	Quỳnh Nhai	16	58,300			1	
		7	Sông Mã	20	126,099	1			
		8	Sốp Cộp	11	39,038	1		1	
		9	Thuận Châu	30	147,374				
		10	Yên Châu	15	68,853	1			
		11	Vân Hồ	16	55,797	1			
11	Phú Thọ						14.11		16.55
		1	Cẩm Khê	31	125,790				
		2	Đoan Hùng	28	103,743				
		3	Hạ Hoà	33	104,872				
		4	Lâm Thao	14	99,859				
		5	Phù Ninh	19	94,094				
		6	Tân Sơn	17	76,035				
		7	Thanh Ba	27	108,015				

12	Bắc Giang						12.00		15.39
		1	Lạng Giang	23	191.048				
		2	Sơn Động	23	68,724				
		3	Tân Yên	24	158,547				
		4	Việt Yên	19	159,936				
		5	Yên Dũng	21	135.075				
13	Yên Bái						46.00		32.53
		1	Lục Yên	24	102,946				
		2	Mù Căng Chải	14	49,255				
		3	Trạm Tấu	12	26,704				
		4	Trần Yên	22	79,397				
		5	Văn Chấn	31	144,152				
		6	Văn Yên	27	116,000				
		7	Yên Bình	26	39,420				
14	Hà Nam						1.00		10.68
		1	Bình Lục	19	133,978				
		2	Duy Tiên	20	115,011				
		3	Kim Bảng	18	116,054				
		4	Lý Nhân	23	175,878				
		5	Thanh Liêm	17	113,077				
15	Nam Định						1.00		8.3
		1	Giao Thủy	22	188,875				
		2	Hải Hậu	35	256,864				
		3	Vụ Bản	18	129,669				
		4	Xuân Trường	20	165,739				
		5	Ý Yên	32	227160				
16	Vĩnh phúc						3.45		8.69
		1	Bình Xuyên	13	108,246				
		2	Lập Thạch	20	118,646				
		3	Sông Lô	17	88,616				
		4	Tam Dương	13	94,692				
		5	Tam Đảo	9	69,084				
17	Ninh Bình						2.00		9.85

		1	Gia Viễn	21	115,708			
		2	Hoa Lư	11	66,187			
		3	Kim Sơn	27	164,735			
		4	Nho Quan	27	143,083			
18	Hà Tĩnh						1.00	17.44
		1	Cạn Lộc	23	127,515			
		2	Cầm Xuyên	29	141,216			
		3	Hương Khê	22	100,212	1		
		4	Hương Sơn	32	117,167	1		
		5	Kỳ Anh	21	120,518			
		6	Lộc Hà	13	78,802			
		7	Nghi Xuân	19	97830			
		8	Vũ Quang	12	30,989	1		
19	Nghệ An						13.35	18.79
		1	Anh Sơn	21	99,358	1		
		2	Kỳ Sơn	21	69,524	1	1	
		3	Nghi Lộc	30	184,148			
		4	Quế Phong	14	62,129	1	1	
		5	Quý Hợp	21	116,554			
		6	Thanh Chương	40	248,952	1		
		7	Tương Dương	18	72,405	1	1	
		8	Đô Lương	33	183,584			
		9	Con Cuông	13	64,240	1		
		10	Nam Đàn	24	149,826			
		11	Quỳnh Lưu	22	279,977			
		12	Tân Kỳ	22	129,031			
20	Quảng Bình						8.90	21.17
		1	Bố Trạch	30	178,464	1		
		2	Lệ Thủy	28	140,527	1		
		3	Mình Hóa	16	47,083	1	1	
		4	Quảng Ninh	15	86,845	1		
		5	Quảng Trạch	18	95,542			
		6	Tuyên Hóa	20	77,700	1		

21	Quảng Trị						9.00		16.41
		1	Cam Lộ	9	44,731				
		2	Gio Linh	21	72,083				
		3	Hương Hóa	22	74,216	1			
		4	Hải Lăng	20	86,335				
		5	Triệu Phong	19	94,610				
		6	Vĩnh Linh	22	85,584				
		7	Đakrông	14	36,437	1		1	
		8	Đào Cồn Cỏ	13	83				
22	Thanh Hóa						14.40		20.37
		1	Bá Thước	23	96.36			1	
		2	Hoàng Hóa	43	250,534				
		3	Lạng Chánh	11	45,346	1		1	
		4	Mường Lát	9	33,182	1		1	
		5	Như Xuân	18	64,319			1	
		6	Quan Hóa	18	43,789	1		1	
		7	Quan Sơn	13	35,435	1		1	
		8	Quảng Xương	30	227,971				
		9	Thường Xuân	17	83,218	1		1	
		10	Thạch Thành	28	136,221				
23	Ninh Thuận						22.70		13.47
		1	Bác Ái	8	24,304				
		2	Ninh Hải	9	89.42				
		3	Ninh Phước	9	135,146				
		4	Thuận Bắc	6	37,769				
24	Quảng Nam						6.80		20.9
		1	Bắc Trà My	13	38,218				
		2	Hiệp Đức	12	38,001				
		3	Nam Giang	12	22.99	1			
		4	Nam Trà My	10	25,464			1	
		5	Nông Sơn	7	31.47				
		6	Phước Sơn	12	22,586			1	
		7	Tiên Phước	15	68,877				

		8	Tây Giang	10	16,534	1		1	
		9	Đông Giang	11	23,428				
25	Quảng Ngãi						11.60		20.69
		1	Ba Tơ	20	51,468			1	
		2	Bình Sơn	25	174,939				
		3	Minh Long	5	15,498			1	
		4	Lý Sơn	3	18,223				
		5	Sơn Hà	14	68,345			1	
		6	Sơn Tây	8	18,092			1	
		7	Sơn Tịnh	11	95,597				
		8	Trà Bồng	10	29,699			1	
		9	Tây Trà	9	17,798			1	
		14	Đức Phổ	15	140,093				
26	Đắk Lắk						31.30		17.39
		1	Buôn Đôn	8	59,959	1			
		2	Cư Kuin	10	99,551				
		3	Cư M gar	17	163.6				
		4	Ea H'Leo	12	120,968				
		5	Ea Kar	16	141,331				
		6	Krông Búk	7	57,387				
		7	Krông Ana	8	81,010				
		8	Krông Năng	12	118,223				
		9	Lắk	11	59,954				
27	Đắk Nông						33.00		22.52
		1	Cư Jút	9	88,264	1			
		2	Đắk Glong	6	29,248				
		3	Đắk Mil	11	87,831	1			
		4	Đắk R'Lấp	11	74,087				
		5	Đắk Song	9		1			
		6	Krông Nô	10	62,888				
		7	Tuy Đức	6	38,656	1			
28	Gia Lai						38.48		23.75
		1	Chư Păh	15	67,315				
		2	Chư Puh	9	54.89				
		3	K'Bang	14	61,682				

		4	Kông Chro	14	42,635				
		5	La Grai	16	88,613	1			
		6	Mang Yang	12	53.16				
		7	Phú Thiện	10	70,881				
		8	Đắk Pơ	8	38,017				
		9	Đức Cơ	11	62,031	1			
29	Kon Tum						53.64		27.91
		1	Kon Rẫy	7	22,622				
		2	Ngọc Hồi	8	41,828	1			
		3	Sa Thầy	11	41,228	1			
		4	Tu Mơ Rông	11	22,498			1	
		5	Đắk Tô	9	37.44				
		6	Đắk Hà	11	61,665				
		7	La H'Drai	3	11,644	1			
30	Lâm Đồng						22.80		9.7
		1	Bảo Lâm	14	109,236				
		2	Cát Tiên	12	37,112				
		3	Lạc Dương	6	19,298				
		4	Đam Rông	8	38,407			1	
		5	Đạ Huoai	10	33.45				
		6	Đạ Tẻh	11	43.81				
31	Bình Phước						19.30		6.9
		1	Bù Đăng	16	131,296				
		2	Bù Đốp	8	45,253	1			
		3	Bù Gia Mập	9	147,967	1			
		4	Lộc Ninh	15	115,268	1			
32	Tây Ninh						1.69		4.27
		1	Tân Châu	12	94,112				
		2	Bến Cầu	9	62,934	1			
		3	Châu Thành	15	130,101	1			
		4	Hòa Thành	8	139,011				
33	An Giang						5.06		7.84
		1	An Phú	14	191,328	1		1	
		2	Thoại Sơn	17	112,000				

		3	Tri Tôn	15	127,426	1		1	
		4	Thị Xã Tân Châu	14	172,088	1		1	
		5	Tịnh Biên	14	47,128	1		1	
34	Bạc Liêu						10.59		15.29
		1	Phước Long	8	117,700			1	
		2	Hòa Bình	8	106,800				
		3	Hồng Dân	9	105,200				
35	Vĩnh Long						2.78		7.91
		1	Bình Tân	11	93,142				
		2	Long Hồ	15	160,537				
		3	Mang Thít	13	99,201				
		4	Vũng Liêm	20	159,183				
36	Kiên Giang						14.43		7.23
		1	Thị Xã Hà Tiên	7	44,721			1	
		2	An Biên	9	122,068				
		3	Giang Thành	5	28,910			1	
		4	Hòn Đất	14	166,860				
		5	Kiên Hải	4	20,807			1	
		6	Phú Quốc	10	91,241			1	
		7	U Minh Thượng	6	67,764				
		250		4,107	20,080,038	82		56	20

Cambodia Health Sector Analysis

Project number: 48118-REG

2016

R-PPTA 8842: THE GREATER MEKONG SUBREGION HEALTH SECURITY PROJECT

Table of Content

Acronyms	2
Summary	4
I. Introduction.....	5
a. <i>Assignment.....</i>	5
b. <i>Regional Health Security.....</i>	5
c. <i>Proposed Project Scope.....</i>	5
II. Country Profile.....	6
a. <i>General.....</i>	6
b. <i>Health Trends.....</i>	7
c. <i>Health Services</i>	8
III. Public Health Threats and Control	11
a. <i>Major Public Health Events</i>	11
b. <i>Progress with IHR/APSED</i>	12
c. <i>Progress with Diagnostics</i>	19
IV. Control of Major Infectious Diseases	21
a. <i>HIV/AIDS</i>	21
b. <i>Tuberculosis</i>	23
c. <i>Malaria.....</i>	26
d. <i>Dengue</i>	28
e. <i>Childhood Infections.....</i>	29
f. <i>Neglected Tropical Diseases.....</i>	30
g. <i>Hospital Infection and Drug Resistance</i>	31
V. Infection Control Program	32
a. <i>Management and Organization</i>	32
b. <i>Surveillance and Response.....</i>	33
c. <i>CDC in Border Areas.....</i>	34
d. <i>Laboratory services</i>	37
e. <i>Hospital Infection Prevention and Control.....</i>	40
f. <i>Public Preparedness</i>	41
g. <i>Regional Cooperation.....</i>	41
VI. MoH Plan and Project Priorities	42
a. <i>MoH Plan.....</i>	42
b. <i>Financing and Cooperation</i>	45
c. <i>Proposed Project Scope and Issues</i>	46
d. <i>Proposed Project Management and Issues</i>	48
e. <i>Gender, Safeguards and Risk Management.....</i>	49
VII. Conclusions and Recommendations	55
a. <i>Conclusions</i>	55
b. <i>Recommendations.....</i>	57
Appendices	58
1. <i>Organogram.....</i>	58
2. <i>APSED Assessment.....</i>	58
3. <i>Problem Tree.....</i>	58
4. <i>Results-Framework</i>	58

Acronyms

ADB	Asian Development Bank
AEC	Asian Economic Community
AET	Applied epidemiology training
AFD	Agence Française de Développement (French Development Agency)
AIDS	Acquired immunodeficiency syndrome
AMR	Antimicrobial resistance
APSED	Asia Pacific Strategy for Emerging Diseases
ARVT	Anti-retroviral treatment (for HIV/AIDS)
ASEAN	Association of South-East Asian Nations
BSL	Biosafety level
CBRN	Chemical, biological, radiological, and nuclear
CDC	Communicable Diseases Control
CDCD	Communicable Disease Control Department
CENAT	National Center for Tuberculosis and Leprosy Control
CLMV	Cambodia, Laos, Myanmar, Viet Nam
CMS	Central medical store
CNM	Cambodian national malaria control program
CPA	Complementary package of activities
CRUMP	Cambodia rural urban migration project
DDF	Department of Drugs and Food
DG	Directorate general
DHS	Department of Hospital Services
DMDP	Diagnostic microbiology development program
DOTS	Directly observed treatment short course
EID	Emerging infectious disease
EHF	Ebola hemorrhagic fever
EID	Emerging infectious diseases
EOC	Emergency operations center
EQA	External quality assurance
EWARN	Emergency warning and response network
FSW	Female sex worker
GMS	Greater Mekong Subregion
HC	Health center
HCP	Health coverage plan
HEF	Health equity fund
HIV	Human immunodeficiency virus
HSP	Health strategic plan
HSSP	Health sector support program
HSP3	Health sector program
IDU	Injection drug user
IHR	International health regulations
IPC	Infection prevention and control
IPT	Isoniazid preventive therapy
LQMS	Laboratory quality management system
MDR-TB	Multi-drug resistant tuberculosis
MEF	Ministry of Economy and Finance
MERS	Middle East Respiratory Syndrome
MEV	Migrants and mobile people, ethnic minorities, and other vulnerable groups
MMP	Mobile and migrant population
MOH	Ministry of Health

MPA	Minimum package of activities
MSM	Men who have sex with men
NCD	Non-communicable diseases
NCDP	National dengue control program
NCHADS	National Center for HIV/AIDS, Dermatology, and STI
NIPH	National Institute of Public Health
NGO	Non-governmental organization
NHSPF	National health and social protection fund
NSDP	National strategic development plan
NSPLS	National strategic plan for laboratory services
NTRL	National TB Reference Laboratory
NTP	National tuberculosis control program
OD	Operational district
PLHIVA	People living with HIV/AIDS
PMRS	Patient management and registration system
PMU	Project management unit
PoE	Point of entry
PPE	Personal protective equipment
RA	Risk assessment
RDT	Rapid diagnostic test
RGC	Royal Government of Cambodia
RH	Referral hospitals
RRT	Rapid response team
RTC	Regional training centers
SARS	Severe acute respiratory syndrome
SEZ	Special economic zone
SOP	Standard operating procedure
SSECC	Ship sanitation exemption control certificate
STI	Sexually transmitted disease
SWIm	Sector wide implementation
TOR	Terms of reference
UN	United Nations
UHC	Universal health coverage
URC	University research corporation
USCDC	United States Center for Disease Control
WHO	World Health Organization

Summary

This report summarizes the Cambodia health sector analysis of the project preparatory technical assistance for the Greater Mekong Subregion Health Security Project (the Project) of Cambodia, Laos, Myanmar, and Viet Nam. It was prepared by the Cambodia co-team leader as part of the project preparation of the Asian Development Bank (ADB).

Cambodia, with a population of 15.6 million in 2015, has gained from rapid increase in connectivity and industrialization. It has seen major migration and rapid urbanization. The country had several outbreaks of emerging infectious diseases, and has a large burden of tuberculosis and dengue, a residual malaria problem, and a concentrated HIV epidemic. Common communicable diseases remain the major burden among children and the poor. Drug resistance is an emerging public health problem. All these constitute major public health and economic risks.

As per Cambodia's Rectangular Strategy III, Cambodia aims to achieve Universal Health Coverage by 2030 as one of the Sustainable Development Goals of the United Nations. Despite a basic network of health services, access, quality and affordability are not yet up to standard. In particular migrants, the poor, and isolated ethnic groups access public health services less. Hence there are gaps in surveillance, prevention, and control of infectious diseases, in particular in border areas and industrial zones, which make it difficult to achieve public health security.

As per National Strategic Development Plan (2014-2018), Cambodia is committed to contribute to global and regional public health security by fulfilling its obligation to build up core capacity in the fight against emerging infectious diseases (EIDs) and other public health events under the International Health Regulation (IHR), 2005. Cambodia participates in the implementation of the WHO-led Asia Pacific Strategy for Emerging Diseases (APSED) and other regional strategies for the control of major diseases such as dengue, malaria, tuberculosis and HIV/AIDS.

The country is not yet in compliance with IHR requirements due by 2016. Despite major political commitments and support from partners including the ADB, the average of the IHR core capacities due by 2016 was estimated at 53%, compared to about 80% for the region. Hence, the Government is committed and pressed to take the necessary steps in bringing the country up to international standards for public health security, and also control major infectious diseases.

To assist Cambodia meet its obligations under IHR/APSED and a number of other treaties and agreements, it is proposed that the project supports expanding the surveillance and response system including regional cooperation, cross-border cooperation, quarantine services, syndromic reporting at village level, risk analysis and community preparedness; and help strengthen the public health system in terms of provincial laboratory services and hospital infection prevention and control in 13 targeted provinces. These provinces are generally more poor, are strategically located along borders, and have large underserved populations posing national health risks.

The Ministry of Health will be the executing agency, and will establish a project management unit. The Department of Planning and Health Information Systems, the Communicable Diseases Control Department, the Department of Hospital Services and the National Institute of Public Health and 13 provincial health offices will implement the Project in the 13 targeted provinces. Total project costs in Cambodia for 2017 to 2022 are estimated at \$22.8 million.

Safeguards mainly concern that the Project reaches migrants and ethnic minorities in border areas most at risk of infectious diseases. Special arrangements will need to be put in place such as specific targets for these groups in annual operational plans and budgets and logistic support.

I. Introduction

a. Assignment

1. The consultant undertook a health sector analysis for the proposed Greater Mekong Subregion (GMS) Health Security Project for Cambodia, Laos, Myanmar and Viet Nam. The purpose was to examine relevance of the proposed scope, and identify project priorities and risks in Cambodia. This report includes (i) a general sector review to identify health system priorities and constraints, (ii) a specific review of public health security progress and gaps, and (iii) review of proposed project scope, risks and implementation and monitoring arrangements.

b. Regional Health Security

2. As per Cambodia's Rectangular Strategy III, Cambodia aims to achieve Universal Health Coverage by 2030 as one of the Sustainable Development Goals of the United Nations. As per the National Strategic Development Plan (NSDP) 2014-2018, Cambodia is committed to contribute to global and regional public health security by fulfilling its obligation to build up core capacity in the fight against emerging infectious diseases (EIDs) and other public health events under the International Health Regulation (IHR 2005)¹. Cambodia participates in the implementation of the WHO-led Asia Pacific Strategy for Emerging Diseases (APSED). The country is progressing towards, but not yet in compliance with, IHR requirements, which are due by 2016. Hence, the Government is committed and pressed to take the final steps in bringing the country up to international standards for public health security.

3. After the SARS outbreak in 2003, several other outbreaks of emerging infectious disease occurred, most of which were identified and controlled at an early stage thanks to a functioning surveillance and response system and cooperation among sectors. MOH has also benefited from support of different development partners including ADB, WHO, USCDC, and AFD to strengthen its surveillance and response system. While core functions for IHR are in place, there are gaps that need to be addressed to optimize public health security in view of general and health system specific constraints.

c. Proposed Project Scope

4. Under the GMS economic development program, ADB has been supporting various health projects for communicable diseases control (CDC), HIV, Malaria, and related regional technical assistance.² The Governments of Viet Nam, Cambodia, Laos, and Myanmar and ADB have prepared the Project to strengthen national health security systems and regional cooperation for the prevention and control of EIDs and other diseases of regional importance in the GMS, and help countries to comply with IHR 2005 and implement APSED of the WHO.³

¹ WHO International Health Regulations 2005 Second Edition. The IHR (2005) is a legally binding document for all member states of the WHO. The purpose and scope of IHR are to “*prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade*”. Cambodia has also actively participated in different activities at national, regional and global levels leading to the adoption of the IHR (2005).

² Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

³ World Health Organization. *Asia Pacific Strategy for Emerging Diseases*. 2010.

5. The proposed regional project goal is strengthened GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities, (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year, and (iii) increased use of public health services in border areas by MEVs. The proposed regional project outcomes are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed regional project outputs are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed project targets 13 provinces in Cambodia along the borders and economic corridors with Laos, Thailand and Viet Nam. Total project costs in Cambodia for 2017 to 2022 are estimated at \$22.8 million.

II. Country Profile

a. General

6. Cambodia's population was estimated at 15.6 million in 2015, with a population density of 84 persons per square kilometer⁴. The country is divided into one Municipality (Phnom Penh) and 24 provinces. The 24th province of Tbong Khmum was officially split from Kampong Cham province by Royal Decree dated 31 December 2013 and officially launched on June 2014.

7. Cambodia continues to enjoy robust growth, albeit at a slightly slower pace (World Bank). Real growth for 2014 is estimated to have reached 7.0% GDP but there are signs of slowing growth in the garment industry and in agriculture. The forecast for 2016 and 2017 are respectively 6.9% and 6.8%. Moreover, data suggest that economic growth has been particularly favorable for the less well off, perhaps linked to migration and employment of the poor.

8. Poverty continues to fall in Cambodia. As of 2012, the poverty headcount rate (according to the national poverty line) was 17.7%, almost 3% lower than in 2011. Poverty is considerably higher in rural areas than in urban areas. The Phnom Penh area is already facing problems with the rapidly increasing number of poor migrants.

9. A special feature in border areas is the creation of Special Economic Zones (SEZ), where industrial development generates a rapid increase in the labor force causing pressure on health facilities. There are currently 14 SEZ, 4 in Svey Rieng province near the Vietnamese border, 4 in Preah Sihanouk port, and 2 in Banteay Meanchey province near Thailand⁵.

10. The Census 2008 enumerated nearly 3.6 million migrants across the country. Migration is partly rural to rural and urban to urban. More women than men migrate to urban areas. Employment is the main reason for migration followed by education and marriage. According to the Cambodian Rural Urban Migration Project (CRUMP) survey in 2012, an overwhelming majority of surveyed villages (349 out of 375) are losing population, mainly for economic reasons. The CRUMP survey also reveals that the educational attainment of these all-time migrants is low, but higher than non-migrant counterpart⁶.

11. In terms of external migration, this is mostly to Thailand, with Malaysia and Korea also as important destination countries. The Cambodian and Thai Government signed a Memorandum of Understanding in 2003 to regulate the flow of migrants. However, in 2006, it was estimates

⁴ <http://data.worldbank.org/indicator/SP.POP.TOTL>

⁵ Council of Development of Cambodia, CDC: Legal Frame for Special Economic Zones (SEZ) Schemes, available at <http://www.cambodiainvestment.gov.kh/legal-frame-for-the-special-economic-zone-sez-scheme.html>

⁶ Ministry of Planning, *Integration of demographic perspectives in development*, Cambodia, April 2013

that 90% of Cambodian migrants in Thailand were irregular⁷, and currently it is estimated that half the Cambodian migrants in Thailand are not registered⁸. People opt for illegal cross-bordering due to the high costs of recruitment agencies, visa and registration costs. The World Bank estimates there are 348,710 emigrates, which represents 2.5% of the total population.

12. Cambodia is a member of the Association of Southeast Asian Nations (ASEAN) which is in the process of creating the ASEAN Economic Community (AEC), to allow the free flow of goods, services, investments, and skilled labor, and the freer movement of capital across the region⁹. This will likely cause further exodus of migrants to other countries, in particular the well-educated persons, including for medical services. Currently, about 20% of Cambodians with (public or private financed) university degree have emigrated.

13. To sustain the momentum of growth and development, based on the Rectangular Strategy, the Royal Government of Cambodia (RGC) has formulated the NSDP 2014-2018 as the road map to implement the Rectangular Strategy Phase III with identification of priorities, indicators and timeframe for the implementation and also mechanism for the Monitoring and Evaluation of the Result Framework, especially setting the responsibility of the line ministries and agencies within each angle in order to gain high benefits from ASEAN Economic Integration in 2015 and to move out of the Least Developed Countries and to become an Upper-Middle-Income Country in 2030.

14. The World Bank East Asia Pacific update of April 2015 recommends further investment in health, education and social protection to help increase productivity and welfare. Special attention should be paid to malnutrition and low education attainment which are more prevalent among the poor¹⁰.

b. Health Trends

15. The health status of Cambodian people has improved as evidenced by an improved life expectancy at birth from 54.5 for males and 58.3 for females in 1998 to 67.5 years and 71.4 years for males and females in 2015 [NSDP 2014-2018].

16. Cambodia has achieved most of its MDGs, as shown in table 1. It had been particularly successful in reducing maternal and child mortality, and the HIV prevalence. Malnutrition has declined less. For mother and child health, there is a decrease in total fertility rates from 4.0 to 2.7 children per woman of reproductive age between 2000 and 2014. In the same period, the infant mortality rate decreased from 95 to 28 per 1,000 live births and the under-five mortality rate decreased from 124 to 35 per 1,000 live births. The maternal mortality ratio decreased from 472 to 170 per 100,000 live births from 2005 to 2014. The trend in malnutrition from 2000 to 2014 seems stagnant or progress less.

17. Overall, from 2000 to 2015, Cambodia is seeing a decline in the burden of communicable diseases¹¹, an increase in non-communicable diseases (NCDs) and increase in death by road accidents from 2,148 in 2014 to 2,265 in 2015¹².

⁷ Maltoni, Bruno (2006) *Review of Labour Migration Dynamics in Cambodia*, IOM.

⁸ Country profile- Cambodia available at

https://www.iom.int/jahia/webdav/shared/shared/mainsite/activities/countries/docs/country_profile_cambodia.pdf

⁹ ADB Twelve things to know about ASEAN Economic Community available at

<http://www.adb.org/features/asean-economic-community-12-things-know>

¹⁰ http://www.worldbank.org/content/dam/Worldbank/document/EAP/cambodia/Cambodia_EAP_Update-Apr2015_ENG.pdf

¹¹ The burden of diseases does not include ongoing investments to keep diseases under control.

¹² MoH report, National Health Congress 9-10 March 2016

Table 1: Cambodia Health MDG Progress and Targets

MDG Indicator	Units	2000	2005	2010	2014	Target 2015
Maternal mortality ratio	Maternal deaths per 100,000 live births	437	471	206	161	250
Total fertility rate	Average expected births per woman	4	3.4	3	2.9	3
Infant mortality rate	Infant deaths per 1,000 live births	95	66	45	28	50
Under 5 mortality rate	Child deaths per 1,000 live births	124	83	54	42.5	65
Child malnutrition rate:	% of malnourished children below 5 years	50	43	40	32	25
- Stunted:		17	8	11	10	6
- Wasted:		39	28	28	24	19
- Underweight :						
HIV prevalent rate	% HIV positive in age group 15-45 years	1.7		0.8	0.6	1.8
Decrease in tuberculosis death compared to 1990 data	Tuberculosis deaths ratio as % year/1990			50 (2011)	63	50
Malaria case fatality rate reported by public health sector	Per 100,000 population			0.65 (2011)	0.06 (2015)	0.1

Source: MOH Cambodia

c. Health Services

18. According to the Constitution of the Kingdom of Cambodia, the health of the people shall be guaranteed. The State shall pay attention to disease prevention and medical treatment. Poor people shall receive free medical consultations in public hospitals, infirmaries and maternity clinics. The State and society shall provide opportunities to women, especially for those living in rural areas without adequate social support, so that they can obtain employment and medical care, send their children to school and have decent living conditions¹³.

19. The attrition of Cambodian health services began in 1970 with the civil war following the Lon Nol coup, the Khmer Rouge genocide (1975-79), the UN sanction (1980-1991) and the persisting insecurity in remote areas until 1997. Health facilities were extensively destroyed and the medical workforce was decimated. Health personnel were thereafter trained in an accelerated manner with limited resources and with a strong focus on hospital services.

20. After the devastation of the war, Cambodia has made major progress in rebuilding its health system. The proportion of deliveries by health staff and in both public and private facilities rose from 39% to 80% between 2008 and 2014. Delivery by c-section compared with total deliveries rose from 1.0% to 5.4% from 2008 to 2014. Vaccination coverage of children under one year of age fluctuates from 92% to 98% between 2008 and 2014. The contraceptive prevalent rate rose from 25% to 35% between 2008 and 2014.

21. The chosen approach to reconstruction includes a comprehensive health sector reform initiated in 1996. The Health Coverage Plan¹⁴ (HCP) 2004-2005 was developed based on population and physical access criteria disregarding the former administrative structure.

¹³ Constitution of the Kingdom of Cambodia: <http://www.crrt-cambodia.org/wp-content/uploads/2011/01/Constitution-of-the-kingdom-of-Cambodia-EN.pdf>

¹⁴ MOH DPHI Health Coverage Plan 2004-2005

Operational districts (ODs) were established. The HCP also proposed one public health center per 8-12,000 people, and one health facility within 4 kilometers or one hour walk. Between 2004 and 2014, ODs were increased from 76 to 88, referral hospitals (RHs) from 69 to 97, health centers (HCs) from 966 to 1,105 and health posts (HPs) from 79 to 106¹⁵. Health posts were added to improve access to less populated areas, in particular in poor north-eastern border provinces, but also reflect settlement of migrants in these areas.

22. The number of health staff rose from 18,302 to 20,974 between 2010 and 2014. From 2012 to 2014, the national budget recurrent spending rose from KhR 196 billion to KhR 275 billion, about \$49 million to \$69 million (1 US\$ roughly equivalent to 4,000 Riels). As of 2014, 81 hospitals and 659 health centers are covered by Health Equity Funds (HEF) either financed by national budget and development partners or subsidized by the government (SUBO) and financed by the national budget. It is also interesting to note that there is also a remarkable increase in private facilities from 1,521 to 1,919 between 2011 and 2014.

23. The organogram of the Ministry of Health¹⁶ is characterized by a management level (Minister, Secretaries of State, Under-Secretaries of State and the Cabinet) and a technical level comprising of 3 Directorate General (DG) (Administration and Finance, Health, and Inspection). The DG for Health is composed of 7 departments, namely the Departments of (i) Planning and Health Information; (ii) Human Resource Development; (iii) Drug, Food and Medical Equipment and Cosmetics; (iv) Hospital Services; (v) Preventive Medicine; (vi) Communicable Disease Control and (viii) International Cooperation. There are 6 national hospitals, 8 national centers, a university of health sciences, a national institute of public health, and a central medical store.

24. The first Health Sector Strategic Plan (HSSP1), 2003-2007, aimed to improve the health of mothers and children in particular.¹⁷ HSSP1 introduced sector wide management or sector-wide implementation (SWIm) and emphasized decentralization of health administration; health promotion and prevention; human resources development; public-private partnerships; effective use of health information for evidence-based planning; health financing systems to promote equitable access; and legal provider and consumer protection.

25. HSSP1 review led to three key recommendations: (i) make policy decisions immediately in areas where advanced experimentation has been made, including for reformed contracting, expanded HEFs, and improved remuneration of health staff; (ii) further strengthen institutional roles and responsibilities across the health system, with capacity building, and improve links between the next Health Strategic Plan (HSP) strategy and the monitoring system; (iii) Consolidate aid effectiveness management, addressing the current fragmented status of donor financing.

26. A second HSP 2008-2015¹⁸ was developed to coincide with the 2015 MDG milestones. The strategic priorities are: (1) maternal and child health; (2) communicable diseases; and (3) NCDs. Five cross-cutting strategic areas were: health service delivery, health care financing, human resources for health, health information systems, and health system governance. A clearly defined set of health services were assigned to different levels of facilities with the Minimum Package of Activities (MPA) for Health Center (HC) level and Complementary Package of Activities (CPA) for Referral Hospitals (RH).¹⁹

¹⁵ MOH Health Sector Progress in 2014. The number declined from 121 in 2012 as some were upgraded.

¹⁶ Roles and responsibilities of the MOH are stipulated in Article 3 of the Sub-decree 67 dated 22 October 1997.

¹⁷ MOH Health Sector Strategic Plan 2003-2007 available at http://www.racha.org.kh/rc2008/277/Eng_Summary.pdf

¹⁸ MOH National Strategic Plan 2008-2015 available at http://www.medicam-cambodia.org/publication/download.asp?publication_id=4&pub_language=English

¹⁹ Peter Hill: Analyzing disrupted health sectors: a toolkit, The case of Cambodia: http://www.who.int/hac/techguidance/recovering_healthsector/en/index7.html

27. MOH is now in the process of devising the Third Health Strategic Plan (HSP3) for the period 2016-2020²⁰. It identifies outstanding challenges posed by the Cambodian health MDGs and the new agenda of the post-2015 Sustainable Development Goals (particularly advancing universal health coverage). The health sector analysis for HSP3 offers 14 recommendations as shown in box 1:

HSP3 recommendations

1. Use the HSP3 and the successor to the Second Health Sector Support Program (HSSP2) to focus attention not only on national plans but on the operations of each health center, OD and hospital;
2. Fully implement the commitment to achieve national population coverage of the poor by extending the HEFs to every operational district and every health facility;
3. Establish the National Social Health Protection Fund (NHSPF) as a national agency and begin the process of institutional development and capacity building;
4. Further improve the quality of service delivery (especially in rural areas) by investing in stronger and more effective systems for pre-service health providers (doctors, nurses, midwives) by supporting reforms at the University of Health Sciences (UHS) and strengthening the Regional Training Centers (RTCs);
5. Fully evaluate the Special Operating Agency (SOA) districts to determine the value of extending SOA coverage as a means of improving the supply side;
6. Investigate opportunities for the use of performance-based management and financing procedures as a means to improve performance and increase efficiencies;
7. Plan for the fuller integration of the National Programs into the broader process of health service delivery (through health centers and hospitals) to lessen the impact of reduced funding for vertical programs from the Global Fund and other donors;
8. Reassess the package of health services included within the Minimum Package of Activities (MPA) and the Complementary Package of Activities (CPA) to account for the impact of economic growth, demographic change and the rising burden of NCDs in an efficient and affordable way;
9. Carry out a costing of the MPA and CPA service delivery packages in order both to link facility reimbursement rates more closely with actual costs and to assess the funding levels required for the expansion of social health protection mechanisms;
10. Further strengthen the health promotion and health prevention activities of the Ministry of Health to stem the longer-term growth of NCDs and reduce health care costs;
11. Prepare draft regulations (Decrees, Sub-Decrees, Prakas, guidelines) designed to implement and enforce existing laws requiring the licensing and accreditation of both public and private health care providers and ensure adequate resources for enforcement;
12. Introduce and evaluate the use of existing contracting and quality evaluation methods (through HEFs and SOAs) to test the ability of private providers to deliver services required by the public system;
13. Begin preparations for the introduction of strategic purchasing as a mechanism to improve public sector efficiency and to integrate private providers into the broader public health care system;
14. Make the use of routinely collected information and evidence a critical part of the health policy and planning process and for more effective monitoring and evaluation; link existing databases established through the HMIS and different national programs; strengthen the HMIS for use as an evidence base for decision making and monitoring; integrate the results of routine national and other definitive surveys into evaluation, planning and policy making.

28. Key pieces of legislation guiding health service delivery in Cambodia include the Law on the Management of Private Medical, Paramedical and Medical Aid Services (2000), and the Policy on Public Service Delivery (2006). Service delivery model has a mixed service delivery system. Public health service delivery is organized through two levels of services, both provided in all operational districts²²:

- 1) The Minimum Package of Activity (MPA) provided at the health centers; and
- 2) The Complementary Package of Activity (CPA) provided at the referral hospitals.

²⁰ Peter Leslie Annear, February 2015, Health Sector Analysis- Cambodia Third Health Strategic Plan (HSP3) 2016-2020

²² WHO Service Delivery Profile of Cambodia available at http://www.wpro.who.int/health_services/service_delivery_profile_cambodia.pdf

29. The private sector does not deliver minimum and complementary packages. Private practitioners, workplaces and international NGOs deliver a limited range of services.

30. Tertiary services are provided by 6 national hospitals which are Phnom Penh based and semi-autonomous. Referral hospitals at national, provincial and district levels are classified at three levels based on number of staff, beds, medicines, equipment and clinical activities:

- **CPA-1 hospitals:** have no large-scale surgery (no general anesthesia), no blood bank or blood deposit, but at least have a basic obstetric service. There were 52 hospitals at this level in 2015²³.
- **CPA-2 hospitals:** CPA-1 plus emergency care services and large-scale surgery (with general anesthesia), including ICU, and other specialized services such blood transfusion, Ear, Nose, Throat (ENT), ophthalmology and orthodontics services. There were 29 hospitals at this level in 2015.
- **CPA-3 hospitals:** have large-scale surgery (with general anesthesia) and more activities (in terms of both numbers of patients and activities) than a CPA-2, and also have various specialized services. In 2015 there were 18 hospitals at this level (Ref. National Health Congress Report 2011).

31. Referral hospitals are expected to support primary care and have resources and expertise available for the district health services. All eight national referral hospitals and 21 of 24 provincial referral hospitals provide CPA-3 level services. Provincial referral hospitals cover 1 or more ODs. The public health service delivery system is oriented towards treating acute illness and disease. However, health centers lack financial resources and ambulances to transfer patients, particularly in rural and remote areas. Other barriers to an effective referral system include road and travel conditions, lack of transportation, and working hours at health centers.

III. Public Health Threats and Control

a. Major Public Health Events

32. Between January to December 2014, 25 events were reported in Cambodia. The main events reported were suspected foodborne illness (n=12 | 48%), closely followed by Avian Influenza (n=9 | 36%). All events (100%) were responded to within 24 hours by the Rapid Response Team (RRT). Risk assessment training was conducted late in 2014 with the Communicable Disease Control Department (CDCD), this led to a risk assessment completed for all events between January to March 2015 (n=7). CDCD conducted both direct and indirect public health interventions in response to these events. Direct interventions included multi-sectoral collaboration in response to zoonotic events, collaboration with laboratories, and risk communication to communities as well as media. Indirect interventions included ongoing workforce training in surveillance and response, as well as applied epidemiology training.

33. In order for Cambodia to assess and demonstrate their capacity to detect and respond to public health emergencies, an outbreak review was conducted in May 2015. The outbreak review included key participants selected based on their involvement in the outbreak.

34. The event selected by the CDCD to review was a suspected foodborne outbreak that was initially detected by the media. The outbreak had an unusually high number of patients (n=852) who reported symptoms including abdominal cramps, diarrhea, fever and nausea, across eight villages. No deaths were reported. Cases were epidemiologically linked to a community event that occurred on 27 March. A case-control study was conducted; meat-rolls consumed at the event were associated with being ill.

²³ MOH Health Coverage Plan updated 29 July 2015

35. Achievements by the CDCD in the detection, risk assessment and response were clearly demonstrated in this review. The outbreak was detected rapidly through event-based surveillance (local media) and also reported to the Operational District by the local Rapid Response Team within hours of individuals getting ill. Following the report to national-level, a risk assessment team was mobilized and a risk assessment conducted. A central level response team was mobilized, this team was compiled of CDCD epidemiologists, staff from the Food Safety Bureau, Department of Drug and Food (DDF), Applied Epidemiology Training (AET) Graduates, and local level rapid response members.

36. The outbreak summary by the CDC also identified areas that needed strengthening. Logistics such as access to vehicles and timely access to funding was discussed as a limitation prior to team departure. Challenges during the investigation included managing the large line list and obtaining food samples. There were reports of insufficient food and water collection equipment, and delays in the release of laboratory results. Communication was highlighted as an area requiring improvement, particularly cross-departmental communication, the utilization of prevention messages, and delays in the full analysis and sharing of the outbreak report. Overall, this outbreak review highlighted the progress made by Cambodia in reaching IHR core capacities, using APSED as a framework.

b. Progress with IHR/APSED

37. Cambodia is committed to fulfill its obligation to build up core capacity in the fight against emerging infectious diseases (EIDs) and other public health events under the International Health Regulation (IHR 2005)²⁵. Cambodia participates in the implementation of the WHO-led Asia Pacific Strategy for Emerging Diseases (APSED). The country is not yet in compliance with IHR requirements, due by 2016. As per NSDP 2014-2018, the Government is committed to comply with international standards for public health security.

38. To coordinate and roll out IHR/APSED and address public health emergencies, a National Focal Point was established in the CDCD of the MOH. CDCD comprising of 3 bureaus (Surveillance Bureau, Prevention and Control of Communicable Diseases Bureau and Health Quarantine Bureau) is tasked with the overall coordination with relevant national and international stakeholders to meet the core capacity requirements under these Regulations. A surveillance manual was developed in 2004 and the Cambodia Early Warning (CamEWARN) has been in operation since 2005. During the national surveillance system review in 2008, the disease list was modified to 10 diseases/syndromes. The MOH has also actively engaged with WHO headquarter for the development of a guide for monitoring and evaluating communicable disease surveillance and response systems²⁶.

39. Progress made against the Cambodian National Workplan for Emerging Disease and Public Health Emergency to Achieve IHR Core Capacities (2014-2016) was reviewed and documented in 2014²⁷. The summary of key challenges and priorities for surveillance and response identified for the period from June 2014 to June 2015 is depicted in the APSED assessment. Practical experiences have been gained by the MOH following the responses to

²⁵ WHO International Health Regulations 2005 Second Edition. The IHR (2005) is a legally binding document for all member states of the WHO. The purpose and scope of IHR are to “*prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade*”. Cambodia has also actively participated in different activities at national, regional and global levels leading to the adoption of the IHR (2005).

²⁶ WHO 2006: Communicable disease surveillance and response systems- Guide to monitoring and evaluating.

²⁷ National Workplan for Emerging Disease and Public Health Emergency to Achieve IHR Core Capacities (2014-2016)

cholera outbreaks in 1999 and 2009, SARS in 2003, avian influenza A/H5N1 in 2004, pandemic influenza H1N1 in 2009, outbreaks of hand, foot and mouth disease caused by enterovirus EV71 in 2012 and other food borne diseases.

Table 2: Summary of key achievements in 2014-2015

1. Surveillance and Response
<ul style="list-style-type: none"> • Web-based CamEWARN and training were rolled out across country. • CamEWARN Indicator Based Surveillance (IBS) weekly report is available online. • Risk assessment training was conducted. • Risk assessments were conducted prior to all national investigations in 2015. • Multi-sectoral foodborne SOP was developed. • 2014 National epidemiology conference conducted. • Applied Epidemiology Training (AET) produced 15 introductory and 5 foundation course graduates every year since 2011 • AET curriculum and recruitment protocol revised enhance quality of course. • AET trainees and graduates involved in event detection and investigation. • Both a surveillance and outbreak manual are available to RRT.
2. Laboratories
<ul style="list-style-type: none"> • The EQA program was expanded to 31 laboratories located in national and provincial referral hospitals. • The national laboratory assessment (2013-2014) results were disseminated. • The National Laboratory Strategy (2015-2020) was reviewed, published, and disseminated. • In-service mentorship and supplies/reagents were provided for microbiology diagnostics. • A list of notifiable pathogens which laboratories are required to report to MOH was developed. • The national Policy and Strategy to Combat Antimicrobial Resistance (AMR) was disseminated. • A national antibiotic resistance surveillance system is under development. • Drafts of the Medical Laboratory Biosafety Guidelines and ToR for the Medical Laboratory Biosafety Committee have been developed and are under review.
3. Zoonoses
<ul style="list-style-type: none"> • An inter-ministerial committee is in place to facilitate coordination for the detection of and response to zoonotic events. • The Zoonosis Technical Working Group is in place and holds monthly meeting. • National Strategy for Rabies Control and Elimination was developed. • Information was shared among sectors and response to the H5N1 cases was timely.
4. Infection Prevention and Control (IPC)
<ul style="list-style-type: none"> • Five hospitals identified as “IPC Centre of Excellence”. • Assessment tool for EID preparedness including isolation units, screening and health care waste management, was developed and 8 national and provincial key hospitals were assessed. • Workplans developed to improve triage and isolation units. • 25 hospitals were trained in 3 modules of general IPC guidelines and 10 Complementary Package of Activities level 3 (CPA3) hospitals trained with all modules of general IPC measures. • IPC training focusing on Ebola was conducted, at 2 health centers, 4 district hospitals, 1 municipality hospital and 5 national hospitals in Phnom Penh, and 3 selected provincial hospitals where big land crossings and the international airport are • SOPs to handle Ebola, MERS and other EIDs at health facilities were drafted. • Personal Protective Equipment (PPEs) have been included in Essential Medicine List

(EML).
5. Risk Communication
<ul style="list-style-type: none"> • Standard operating procedures (SOP) were developed. • Simulation exercise was carried out on Emerging Infectious Disease (EID). • Risk Communication Manual was pilot tested. • Key messages and information, education and communication (IEC) materials (posters, health notices, radio spots) were developed for MERS and Ebola.
6. Public Health Emergency Preparedness
6.1 Public Health Emergency Planning
<ul style="list-style-type: none"> • Assessment for natural hazards was conducted and National Strategic Plan on Disaster Risk Management for Health (2015-19) was developed. This plan includes “Proposed Standard Template for Provincial Health Contingency planning” which was developed in Kratie and Kampong Cham provinces. • Resources are available for 10 provinces. • Emergency Operation Center (EOC) is in place at CDC Meeting Room • List of epidemiologists and laboratory experts is available.
6.2 National legislation, policy and financing
<ul style="list-style-type: none"> • Sub-decree for quarantine officers was developed and already approved by interministerial, and will be submitted to government Cabinet for final approval (the subdecree was actually approved on 17 September 2015)
6.3 Coordination and National Focal Point (NFP) Communication
<ul style="list-style-type: none"> • SOPs for foodborne disease outbreaks was drafted and submitted to 6 involved ministries for approval, expected approval soon. • IHR-NFP works well.
6.4 Human Resource Capacity
<ul style="list-style-type: none"> • Identification of need was estimated at 1 epidemiologist needed per 200,000. Applied Epidemiology Training (AET) has produced 61 introductory course graduates and 20 graduates of foundational course in 4 years. • Progress in human resources development activities is presented under respective technical areas.
6.5 Point of Entry (PoE)
<ul style="list-style-type: none"> • Phnom Penh Airport and Sihanouk Ville Port were designated for IHR implementation (29/1/2015) • Training was conducted for PoE staff on IHR health documents at PoEs (April 2014) • SOPs on Ebola and MERS were completed for Phnom Penh and Siem Reap airports and scenario exercises were conducted • Appropriate medical services were established at Phnom Penh, Siem Reap airports and Sihanouk Ville seaport, e.g. isolation rooms, medical staff referral system • Handbook for Inspection of Conveyance and Issuance of Ship Sanitation Control certificates (SSCs) was translated • Inspectors for conveyances were trained at Sihanouk Sea Port (Nov 2014)
6.6 Food Safety
<ul style="list-style-type: none"> • 296 food additive standards were adopted from the International Codex Alimentarius • 44 food and processed food standards were adopted by the technical working group • Food safety policy and food law are under development. • Inspectors at national and provincial levels were trained by ADB project. • Restaurant/canteen data was established and the list of high/medium/low risk food was drafted • Multi sectoral SOP for food borne disease outbreak response was developed.
6.7 Chemical Events
<ul style="list-style-type: none"> • Focal points were identified in each ministry; Chemical, Biological, Radiological and

<ul style="list-style-type: none"> Nuclear (CBRN). A “National Workshop on Fundamentals of Nuclear Safeguard” was conducted.
6.8 Radiation Emergencies
<ul style="list-style-type: none"> Focal points were identified in each ministry; Chemical, Biological, Radiological and Nuclear (CBRN). “National Workshop on Fundamentals of Nuclear Safeguard” was conducted.
7. Monitoring and Evaluation
<ul style="list-style-type: none"> Annual meeting held to review IHR and APSED implementation Submission of IHR monitoring questionnaire CDC participation to TAG Meeting, Asia-Pacific regions

IHR/APSED Assessment 2015

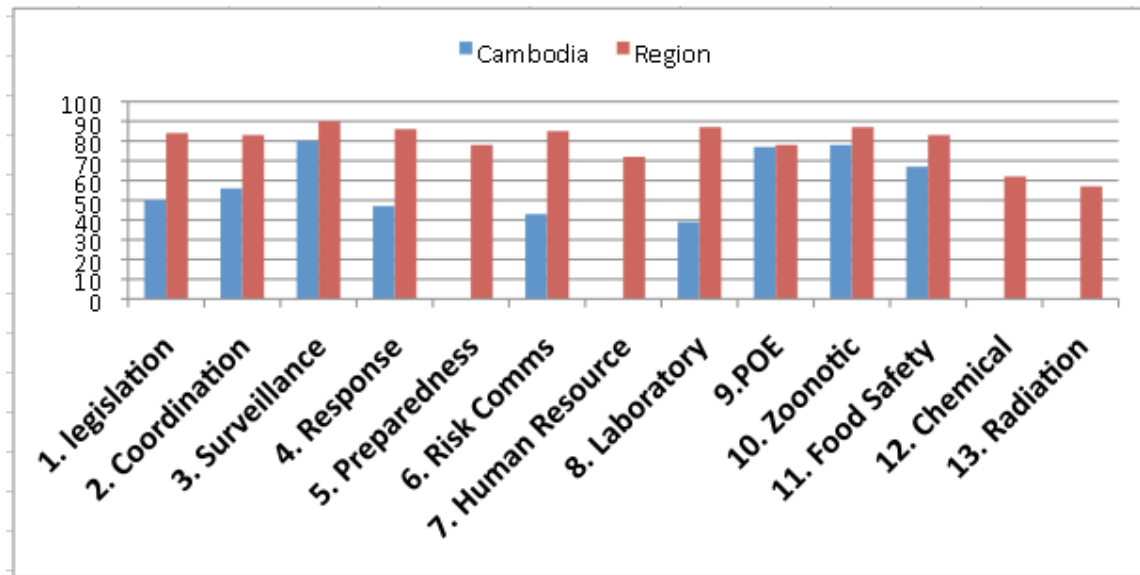
40. The 4th annual national workshop conducted on 11-12 June 2015 reviewed the progress made in IHR/APSED core capacities and major outbreaks, and modified the Cambodian National Work Plan for 2014-2016. Participants included:

- CDCD/ National IHR Focal Point
- Surveillance, Risk Assessment and Response (CDCD)
- Laboratory (Hospital Service Department, NIPH, Pasteur Institute of Cambodia)
- Zoonosis (CDCD, MAFF, NAVRI)
- Infection Prevention & Control (Department of Hospital Services)
- Risk Communications (CDCD)
- Public Health Emergency Preparedness (CDCD, Food Safety Bureau-DDF), Preventive Medicine Department, Ministry of Defense, Ministry of Environment, Ministry of Commerce, Ministry of Industry, Ministry of Interior, Airports/Ports authorities, Ministry of Tourism).

41. Representatives from partners who assist in this field included ADB, Armed Forces Research Institute of Medical Sciences (AFRIMS), AusAID, Defense Threat Reduction Agency (DTRA), the European Union, FAO, Pasteur Institute of Cambodia (IPC), Naval Medical Research Unit-2 Detachment Phnom Penh (NAMRU-2), UNICEF, USAID, USCDC, the World Bank, WHO, Diagnostic Microbiology Development Program (DMDP), Merieux Foundation, South East Asia Field Epidemiology and Technology Network (SAFETYNET), OIE-World Organization for Animal Health, University Research Co. (URC), Wildlife Conservation Society (WCS), and Sihanouk Hospital Center of Hope (SHCH).

42. In 2012, Cambodia, along with other 8 countries in the Western Pacific Region of WHO, was granted extension to meet the core capacity requirements under the IHR(2005). As shown in graph 1, the achievement in 2014 is still not satisfactory and this situation leads to a second request for extension until mid-June 2016. Priority areas are response, preparedness, risk communication, human resources, laboratory, and chemical and radiation hazards.

Graph 1: Cambodia and Western Pacific region IHR monitoring questionnaire average core capacity score comparison, 2014



43. The challenges and priorities identified for the period from February 2014 to June 2015 for the IHR/APSED implementation in Cambodia are summarized in the following table and will be the basis for all stakeholders to further consolidate their activities as per priorities of the specific technical areas. Following detailed discussions with stakeholders, possible project relevance is provided in the third column.

Challenges	Priorities	Possible Project Support
1. Surveillance and Response		
<ul style="list-style-type: none"> - Indicator Based Surveillance (IBS): data analysis and supervision at local level, limited - Funding from Government, limited - Evaluation of EBS, not yet conducted - Risk Assessment (RA) understanding, limited - AET, limited financial, human resources and planning support - Notifiable reporting from laboratories, not yet routine - Outbreak response funding, limited - Multi-sectoral food borne SOP not yet authorized 	<ul style="list-style-type: none"> - To revise an update surveillance manual - To evaluate Event Based Surveillance (EBS) system - To increase data analysis capacity at local level - To formalize the process of laboratory notifiable disease surveillance - To carry out RA training for provincial RRT and AET as well as further training for central level - To develop outbreak response SOP - To continue AET strengthening/ planning - Continue response training of local and provincial RRT 	<ul style="list-style-type: none"> - Extending the system to lower levels - Village-based syndromic reporting - Outbreak financing - HRD including for risk assessment and field epidemiology.
2. Laboratories		
<ul style="list-style-type: none"> - Laboratory biosafety regulations, lacking - Funding from Government, limited - National curriculum for AMR training, lacking - Laboratory services, under utilized - Fragmentation due to vertical 	<ul style="list-style-type: none"> - To finalize biosafety guidelines - To establish Biosafety Committee - To develop biosafety regulations - To integrate CamLIS into the Patient Management and Registration System (PMRS) - To assess biosafety and 	<ul style="list-style-type: none"> - High technology diagnostic virology is being assisted by several partners at central level and there is no need to provide this capacity at lower level - A specimen transportation system needs to be developed urgently.

Challenges	Priorities	Possible Project Support
<ul style="list-style-type: none"> - programs - Maintenance of equipment, lacking - Monitoring system for AMR, lacking - Laboratory Information System (lacking integration) 	<ul style="list-style-type: none"> - biorisk management in laboratories - To improve quality of diagnostics through implementation of Laboratory Quality Management Systems (LQMS) 	<ul style="list-style-type: none"> - Most provincial laboratory services are weak in public health diagnostics and this needs to be upgraded further in a phased manner, including possibly bacteriology and drug resistance testing, staff training, and equipment. - Systems for quality assurance and audit need to be improved - Maintenance needs to be improved - Biosafety improvement is supported by partners
3. Zoonoses		
<ul style="list-style-type: none"> - Coordination at sub-national levels, insufficient - Communication between different laboratories, to be improved - Coordinated surveillance, inadequate - AET and CAVET support, insufficient - Systematic collection of data, incomplete - Technical Working Group decision making and information sharing to be improved 	<ul style="list-style-type: none"> - To improve coordinated joint sector surveillance activities - To develop SOP for timely data collection and sharing - To develop 6 priority disease case definitions - To create more operational research projects - To continue to building RRT surveillance and response capacity through AET-CAVET - To broaden healthy village and live bird market activities 	<ul style="list-style-type: none"> - Several partners assist in the core capacity for “one health”. - Regional workshops may be provided to support sharing and strategic planning - Improving markets is not within the scope of MOH - Support for model healthy village may be considered in border areas
4. Infection Prevention and Control (IPC)		
<ul style="list-style-type: none"> - National IPC committee, not fully functional - Qualified human resources, limited at National and provincial levels (CPA3 hospitals) and absence of IPC professional or expert - Budget for enabling environment, limited at all levels to apply IPC measures on every day basis, at the 8 identified hospital for EID case management, and at the 5 IPC Centre of Excellence 	<ul style="list-style-type: none"> - To revise the national IPC committee members, e.g. New term of references (TORs), include technical working group, and include key staff from the MOH departments of budget and finance - To develop IPC strategy and workplan - To develop IPC professionals TOR and train them - To train IPC professionals - To follow up EID preparedness plan in 8 assessed designated hospitals - Pilot project to implement surveillance system in two CPA3 hospitals by trained IPC professionals - To develop a mechanism to detect and report clusters or unusual health events at hospitals - To identify diseases and target groups for hospital acquired infections (e.g. point prevalence surveillance) 	<ul style="list-style-type: none"> - Roll out to lower levels needs to be supported - Staff training and scholarships - Equipments and repairs for hospitals - Including for waste management
5. Risk Communication		
<ul style="list-style-type: none"> - Approval of Strategy and SOPs, delayed - Financial and human resources, limited 	<ul style="list-style-type: none"> - To approve Strategy and SOPs - To finalize and train Risk Communication manual 	<ul style="list-style-type: none"> - Support for risk communication - Support for simulation exercises

Challenges	Priorities	Possible Project Support
<ul style="list-style-type: none"> - External support for evaluation, not existing - Outbreak internal communication, insufficient 	<ul style="list-style-type: none"> - To improve outbreak risk communication - To carry out simulation exercise 	<ul style="list-style-type: none"> - Support for Dengue and HIV risk communication as learning model
6. Public Health Emergency Preparedness		
6.1 Public Health Emergency Planning		
<ul style="list-style-type: none"> - Leadership and funding, limited - Funding for outbreak response, insufficient - Multi-sectoral collaboration, difficult to implement 	<ul style="list-style-type: none"> - To finalize SOP for EOC, train staff and conduct simulation exercise - Develop multi-hazards Public Health Emergency Preparedness and Response Plan. 	<ul style="list-style-type: none"> - Support for simulation exercises - Support for multi-sectoral coordination
6.2 National legislation, policy and financing		
<ul style="list-style-type: none"> - Legislation issues with other existing laws, - Multi-sectoral collaboration, difficult 	<ul style="list-style-type: none"> - To develop CDC law - To process sub-decree about quarantine officers - To upload existing legislation on website 	<ul style="list-style-type: none"> - Supported by WHO
6.3 Coordination and NFP Communication		
<ul style="list-style-type: none"> - Staff time allocation, insufficient - Multi-sectoral coordination and information sharing, difficult 	<ul style="list-style-type: none"> - To develop SOP for multi-sectoral coordination as a part of multi-hazard Public Health Emergency Preparedness and Response Plan - To maintain IHR-National Focal Point functions 	<ul style="list-style-type: none"> - Support for multi-sectoral coordination
6.4 Human Resource Capacity		
<ul style="list-style-type: none"> - Human and financial resources, limited - 75 epidemiologists are needed, - AET program, courses too short for the learning and experiences required - Assessment is needed for other expertise - Human resources issues are reported in other technical sections 	<ul style="list-style-type: none"> - To assess other expertise, - To join to planning process of Human Resource Development Plan and incorporate IHR needs in the plan - To develop a strategic plan to strengthen AET 	<ul style="list-style-type: none"> - Support for FETP, IPC, and laboratory training
6.5 Point of Entry (POE)		
<ul style="list-style-type: none"> - Inspection program to ensure safe environment at facilities, not exist - Surveillance and control of vectors and reservoirs in and near POEs, not exist - Public Health Emergency Contingency Plan (PHECP) Sihanouk seaport, to be finalized - Capacity to issue Ship Sanitation Exemption Control Certificate (SSECC), limited 	<ul style="list-style-type: none"> - To conduct refresher training on conveyance inspection and issuance of SSECC in October 2015 - To conduct simulation exercise on SOP for Ebola/MERS-CoV in the airports in December 2015 - To finalize the public health emergency response plan and train staff at Sihanouk seaport in November 2015. - To develop a protocols for inspection program at facilities and training quarantine officers in March 2016. - To develop capacity to issue Ship Sanitation Exemption Control Certificate (SSECC) in May 2016 - To obtain approval for the Sub-decree for quarantine officers need to be approved. 	<ul style="list-style-type: none"> - Support for regional, cross-border and inter-sectoral cooperation, simulation exercises, and outbreak response - Support for quarantine services and transport.

Challenges	Priorities	Possible Project Support
	<ul style="list-style-type: none"> - To identify expert agencies which have capacities, Develop a protocols for surveillance and control of vectors and reservoirs, and train quarantine officers, designated POEs authorities (before June 2016). 	
6.6 Food Safety		
<ul style="list-style-type: none"> - Food law and regulations, under development - Human and financial resources, limited - Coordination and collaboration, limited - Laboratory's capacity limited - Role and responsibility, not clear 	<ul style="list-style-type: none"> - To train food inspectors/restaurant food handlers/school food vendors/street food vendors (2015-2016) - To conduct laboratory survey (2015) - Develop food safety promotional materials (2015-2016) - To promote food safety program through mass media - To increase the hygiene certificate scheme for restaurants/canteen - Train Food borne disease Outbreak Response Team (FORT) (2015) 	<ul style="list-style-type: none"> - NPHL proposed toxicology capacity Current equipment to be installed - Food safety supported by several partners.
6.7 Chemical Events		
<ul style="list-style-type: none"> - Human and financial resources, limited - TWG at MOH and multi-sectoral levels, not existing 	<ul style="list-style-type: none"> - To propose TWG within MOH - To develop TORs and roles/responsibilities of each ministry - To nominate leading person at MOH as liaison with concerned ministries - To activate multi-sectoral TWG for regular meetings - To develop multi hazard PHE response plan 	<ul style="list-style-type: none"> - This is currently beyond the scope of MOH and needs liaison with concerned national authorities and international agencies - The roles of the National Focal Point for IHR(2005) which is the MOH/CDCD will solve this challenge [Ref. Article 4 of the IHR(2005)]
6.8 Radiation Emergencies		
<ul style="list-style-type: none"> - Human and financial resources, limited - TWG at MOH and multi-sectoral levels, not existing 	<ul style="list-style-type: none"> - To identify focal points at key ministries and MoD - To develop multi hazard PHE response plan - To develop basic SOPs 	<ul style="list-style-type: none"> - This is currently beyond the scope of MOH and needs liaison with military and international agencies
7. Monitoring and Evaluation		
<ul style="list-style-type: none"> - Regional document for planning and IHR monitoring scheme after 2016, not available yet 	<ul style="list-style-type: none"> - To continue M&E in 2016 - To continue to monitor progress of IHR core capacities development - To continue to participate to TAG meeting 	<ul style="list-style-type: none"> - External IHR/APSED evaluation needs to be added

c. Progress with Diagnostics

44. The Ministry of Health, Cambodia, has a commendable platform for improving laboratory services. MOH, WHO and US/CDC conducted an assessment of the national laboratory system and facilities in 2013-2014. It has formulated the National Policy for Medical Laboratory Services and the National Strategic Plan for Laboratory Services (2016-2020). It has laboratory quality standards, and the Cambodia laboratory information system. The assessment makes

recommendations for communicable disease surveillance and control in broad terms. The CDC priorities are reproductive tract infections (HIV/AIDS/STI), TB, leprosy, dengue fever, malaria, helminthiasis, schistosomiasis, emerging and re-emerging diseases and International Health Regulations implementation.

45. Cambodia also has a National Policy for Medical Laboratory Services and a National Strategic Plan for Laboratory Services 2010-2015. The Deputy Director of the Department of Hospital Services (DHS) within MOH is responsible for Medical Laboratory Services. The National Policy for Medical Laboratory Services and the National Strategic Plan for Laboratory Services (NSPLS) reference to the National Guidelines on Complementary Package of Activities for Referral Hospital Development from 2006 to 2010 and stipulate the capacities for laboratories at CPA1 (least advanced) through to CPA3 (most developed) hospitals. Quite an amount of this material is aspirational rather than reflecting current practice and capabilities. A risk associated with this project is that it plans to add diagnostic and reporting requirements to laboratories that are unable to meet existing targets.

46. The most recent Cambodia MOH Annual Performance Monitoring Report identifies dengue and helminths as two priority areas for CDC and complements the TOR for this project, perhaps also based on the large burden of these diseases. However, the “constraints” and “next steps” listed for dengue in this report warrant detailed scrutiny, as the dengue control strategy has been less effective, apart from perhaps training for better case management which resulted in substantial reduction of case fatality rate. In particular, behavioral change communication and general vector control measures have not been very effective. In terms of prevention, the best strategy may be to include dengue control in general surveillance and outbreak response, whereby each case in a village results in a response, and more cases result in responses of district and provincial outbreak response teams. This approach may also induce behavioral change. However, this approach needs to be studied further.

47. An attempt should be made to extend the existing disease surveillance system to commune and village level using a syndromic surveillance system similar to the Pacific Syndromic Surveillance System of the Pacific Public Health Surveillance Network. The four syndromes reported each week in the Pacific are acute fever and rash, diarrhea, influenza-like illness and prolonged fever. Cambodia also learned the inability to sustain a community based surveillance system mainly for financial reason.

48. Cambodia has translated the WHO Biosafety Guidelines into Khmer and distributed them to all laboratories. This is an important first step towards identifying activities needed to make all laboratories safe. It also is essential for the development of Standard Operating Procedures covering laboratory activities. However, WHO Cambodia finds these biosafety guidelines too complicated for use in Cambodia public laboratories. Perhaps the Project could support the identification of 10-20 key points for health centers and district.

49. The previous ADB CDC project began to address the issue of documentation in laboratories, particularly Standard Operating Procedures and this should be continued. WHO Cambodia is also a strong proponent of the (US) President’s Emergency Plan for AIDS Relief (PEPFAR) quality processes.

50. Many Doctors at the provincial and district levels have never heard of diseases like leptospirosis, brucellosis, many of the neglected tropical diseases or many of the agents responsible for diarrheal diseases (i.e. food borne diseases). They also lack the training to interpret the results of serological tests. There is an almost impenetrable divide between many doctors and laboratory staff that hampers appropriate laboratory testing and reliable interpretation of data.

51. The lack of prioritization in the training of undergraduate medical laboratory scientists means that almost all training, even in critical areas of diagnostic activity, are under-resourced. This results in staff entering the workforce poorly prepared for the job ahead of them. The impact and effectiveness of in-service training in the workplace is not evaluated in any systematic manner. MOH Cambodia recognizes these weaknesses and the issues were addressed in the MOH 2008-2015 Strategic Plan – “Increase competency and skills of health workforce to deal with increased demand for accountability and high quality care, including through strengthening allied technical skills and advanced technology through increased quality practice of training, career development, right incentives, and good working environment”.

52. There is an assumption that pediatric vaccine cover provides complete protection against these priority diseases in vaccinees. This assumes that the vaccine delivered was viable e.g. the cold chain was effective, and ignores the requirement of levels of herd immunity in excess of 80 *per cent* to prevent transmission of diseases like measles. This project should include surveillance for vaccine preventable diseases.

53. Significant amounts of equipment were purchased by ADB towards the end of the previous CDC project. The utilization and maintenance of this equipment should be assessed before plans and specifications are developed for further purchases.

54. National staff will require significant assistance in the preparation of specifications for equipment and reagents in order to ensure value for money. A business case needs to be made for each item of equipment costing more than S\$10,000. Spending \$100,000 on a piece of equipment to perform 20 tests per year is unlikely to represent value for money. Wherever possible, procurement should include delivery, calibration and a budget for routine maintenance/re-calibration for, perhaps, 5 years. *This is critical for biohazard safety cabinets.* Specifications for diagnostic kits/reagents must include a requirement for data for sensitivity and specificity for the item and this must be the first priority in identifying a successful tenderer. A strong case can be made for engagement with other donors to try to limit the diversity of brands of common equipment and diagnostic material being purchased. The practice of lumping large numbers of diverse items in a bulk tender almost invariably results in poor value for money. Local staff will require assistance in preparing specifications and in grouping items for tendering if this process is to be employed. This assistance must be provided by someone conversant with the use of laboratory equipment/supplies.

IV. Control of Major Infectious Diseases

55. Control of major infectious diseases is another important aspect of regional public health security. Although it may be less acute, these infections easily cross borders, can have major health and economic impact, and controlling them also helps build health system capacity.

a. HIV/AIDS

56. Cambodia is one of the early countries in the world to have successfully reversed its HIV epidemic and achieved universal access to HIV treatment. This has largely been achieved through firm political commitment, focused and appropriate strategic planning, sound management, broad-based stakeholder partnerships, and effective implementation based on standardized operating procedures. In 2010, in recognition of these achievements, Cambodia received a United Nations MDG award.

57. Cambodia’s response to its HIV epidemic is characterized by three phases. In the first phase, “Cambodia 1.0” from 1991-2000, HIV prevalence among adults peaked at 1.7%, with

more than 20,000 incident cases. The “Cambodia 1.0” response focused on brothel-based HIV prevention, and voluntary, confidential counseling and testing (VCCT), provision of home based care services, and people living with HIV (PLHIV) support groups.

58. The second phase, from 2001-2011, saw a significant decline in adult HIV prevalence (to 0.8%), and a reduction in incident cases (to 1,600) by 2011. In this phase, the overall health system was strengthened, ART coverage reached more than 80% of PLHIV, the continuum of care approach was institutionalized, and HIV programming was linked with tuberculosis and maternal and child health services. In addition, prevention programming was broadened to focus on all key populations - female entertainment workers (FEWs, direct and indirect sex workers), men who have sex with men (MSM), transgender individuals, and people who inject drugs (PWID).

59. In June 2011, the National Centre for HIV/AIDS, Dermatology and STIs (NCHADS) in Cambodia’s Ministry of Health (MOH) launched the third phase of its response²⁸, known as “Cambodia 3.0,” at the UN General Assembly High Level Meeting on AIDS. This phase supports the global goals and targets - “Three Zeros” and “Treatment 2.0” - for intensifying efforts to eliminate HIV/AIDS. This phase of the response runs from 2012 to 2020 and aims to achieve elimination of new infections by 2020. The Cambodia 3.0 initiative recognizes that there remain pockets of high-prevalence rates and high-risk activities, which require greater attention to reaching individuals most-at-risk of infection with prevention, identifying new cases of HIV, and ensuring individuals living with HIV are retained across the HIV care cascade.

60. The adult HIV prevalence has reduced from 2% in 1988 to 0.6% in 2013, and is about 5% in FSWs, 10% in most at risk FSWs, 24% in MSM, and 8% in IDU, although there are problems including the most at risk groups in the sample. HIV is mainly an urban problem, with low prevalence in remote communities. There are an estimated 71,000 people living with HIV/AIDS (PLHA), of which 58,000 require treatment, and 51,000 are currently on treatment, about 20,000 people are to be identified and an additional 7,000 to be put on treatment. The HIV prevalence among migrant, in particular to Thailand, is not known, but likely to be high in north-west Cambodia. Offering migrant workers free treatment for 3 months each time is being considered. The treatment adherence rate is about 80% to 95%. Defaulting on drug treatment is one reason for drug resistance, the other being infection with a drug resistant virus. Testing drug levels in blood to monitor adherence is not being done. NCHADS has 2 viral load testing machines on lease, but has to pay for reagents. Each test costs \$24. Arrangements have been made to collect samples from all provinces. The country has 8 CD4 in different locations, and 1 IPH machine in NCHADS.

61. NCHADS uses the boosted continuum of prevention and care approach. It initiated active case finding including of HIV+ partners with support of USAID. It wants to expand this to 32 high risk ODs. This is contracted out to NGOs. It provides voluntary confidential counseling and testing in 1000 out of 1100 health facilities. Condom use is about 90% in FWs and 50% for sweethearts. A major concern is the spread of general high risk behavior among youth, including heavy use of alcohol and illegal substances, and multiple sex partners. Sex education is included in the school curriculum, but may not deal with teenage high risk behavior, and may not reach out-of-school and unemployed youth. Apparently due to low prevalence among youth, this is not considered a priority. Alternative methods of sexual satisfaction rather than sex are also not much advocated. It is proposed to offer rapid test for HIV using finger prick in 1000 HC, which will refer the patient to the 67 OIT centers in hospitals for a confirmatory test. Drug addiction is increasing, but mostly not by injection. The problem is drawing more attention. MOH

²⁸ MOH Strategic Plan For HIV/AIDS and STI Prevention and Control in the Health Sector in Cambodia 2015-2020

has created a unit to deal with drug addiction. A Methadon clinic is being piloted. Needle exchange services are largely limited to NGOs.

62. The HIV program requires \$30 million per year, for 9 components, based on a multisectoral response, but mostly for NCHADS. This includes \$10 million for ARV and OI drugs per year, and \$3m for counseling and peer education, partly through NGOs to reach high risk groups like MSM. The Global Fund (GF) provides 90% of the drugs; 5-10% of the budget is used for second line drugs, third line treatment is only provided for exceptional cases. The AIDS Law directs that PLHA should get free services, but hospitals charge for services. Due to GF funding constraints, the 2 year budget is being stretched out to 4 years. This does not affect ARVT and the supply of drugs which is adequate, but other activities have been put on hold and about 2500 staff are no longer paid a staff incentive. The new grant for 2016-2017 was approved in October 2015. The GF is committed to continue supporting ARV for PLHA already on treatment, but may not be able to support education and counseling services. The Government will gradually increase its domestic contribution for drugs, starting with \$1m in 2015, and \$1.5 m in 2017.

63. As Cambodia looks to the final years of the 3.0 strategy, and with the decline of external resources, the country is focused on “doing more, and better, with less”. Toward this end, targeting high burden operational districts (ODs), NCHADS is focusing the response on priority interventions, adopting effective innovations, addressing structural factors, and improving the generation and use of strategic information. This HIV & STI Strategic Plan guides the final years of implementation of Cambodia 3.0 and the sustainable achievement of HIV elimination. The Plan will form part of the National Strategic Plan for a Comprehensive Multisectoral Response to HIV, being developed by the National AIDS Authority. This plan will address the ‘non-health’ elements of the national response in Cambodia, such as cultural, gender, legal and socio-economic issues.

64. Key challenges are:

- The need to sustain structures, capacities and services dedicated to HIV and STI prevention, care and treatment, and the early diagnosis and treatment of HIV/TB co-infection.
- Better access to services by the most vulnerable and key-affected populations in a supportive legal and policy environment
- Stronger follow-up along the cascade of services, from creation of and demand for voluntary HIV testing and counseling to sustained and efficiently monitored use of care and treatment, devoting particular attention to gender issues, age and key affected populations.
- Sharper epidemiological targeting and more effective interventions at sufficient intensity and scale, identifying the few new HIV infections and introducing earlier treatment to harness the dual benefit of mortality reduction and prevention of further spread among those at highest risk
- Greater synergy within the health sector and across other sectors of development.

b. Tuberculosis

65. Tuberculosis is associated with poverty and malnutrition, and in the case of Cambodia, with a large burden of neglected infections due to the war. It is common among the elderly, chronically ill, and people in institutions. Despite significant achievements made by the national

TB program in the past decade, Cambodia still remains one of the 22 high TB burden countries in the world²⁹.

66. A major expansion of the TB DOTS program with support of the Global Fund helped reduce TB prevalence from 1,634/100,000 in 1990 to 817/100,000 in 2011, thereby achieving the MDG target. In total, there are 150,000 TB patients. Each year, there are probably around 60,000 new cases, about 40,000 of whom are detected on the basis of the 70% case detection rate attained by 2005. However, Government data suggest a lower prevalence, and estimated all forms of TB at 693 /100,000 in 2009, with an incidence of 442 /100,000 population, accounting for around 60,000 people with new active TB each year including about 27,000 people with infectious forms of tuberculosis. TB is notoriously difficult to diagnose, which may explain differences in disease burden. Extra-pulmonary TB is increasing as a proportion of TB cases, due to better diagnostics. The prevalence of HIV in TB patients, though declining over the years, still remains high at 6.3%. TB mortality had reduced to 63/100,000 population per year, which is also still high.

67. A major concern is the emergence of multiple drug resistant TB. The rate of multi-drug resistant TB (MDR-TB) is not high in Cambodia. However, preliminary results from the second National Drug Resistance Survey (2006) indicate an increase in the prevalence of MDR-TB since the first survey. In 2006, the prevalence of MDR-TB among new smear-positive TB cases was 1.4 % and that among retreatment cases was 10%.

68. Goals for 2025 are very ambitious, 95% reduction in TB incidence, and 90% in TB mortality, based on the 2015 baseline, under the EndTB program. The current TB budget is \$30 million per year, including \$5m from the Global Fund, \$3-4m from USAID, and \$1.5-2m from WHO. For 2014-2017, there is a funding gap of 30-50%, and this is higher for 2018-2020. Critical gaps are in drug procurement, active case finding, mobile clinics, infection control in hospitals in general, and isolation wards in particular, and referral linkages. For migrants, access to treatment when moving abroad also needs to be improved.

69. The National TB Reference Laboratory (NTRL), under the NTP and located within the same premises as the CENAT has about 16 staff, equipped with culture and drug sensitivity testing facilities, and is responsible for planning, training and supervision of TB laboratory services. It is also responsible for External Quality Assurance (EQA) of sputum microscopy services which is provided through a network of 210 microscopy centers covering the entire country. In addition to the NTRL, two provincial TB microscopy centers (at Battambang and Kampong Cham) perform TB cultures.

70. All 96 hospitals and 1300 health centers provide TB DOTS, 100% coverage. TB treatment compliance is reported as 85%. Major success factors are a good drug supply system, and support of 2000 TB affiliated staff, and 25,000 volunteers, who also help identify possible TB cases. There are about 1500 beds in hospitals to treat TB patients. Where feasible in terms of patient compliance, ordinary and MDR-TB cases may be treated at home. Diagnostics capacity improved with digital Xray and GeneXpert for TB and MDR-TB (which previously required culture in a BSL2 lab). Active case detection is being expanded in high risk groups. A TB screening program for children is operational in 27 districts. There are 4 mobile clinics. A public-private partnership program was discontinued due to lack of support.

71. During the past 15 years, the NTP was able to accomplish remarkable achievements with the strong support of its partners. 100% coverage of DOTS services at health center level

²⁹ MOH National Health Strategic Plan for Tuberculosis Control in the Kingdom of Cambodia 2011-2015

was attained by the end of 2004; since 1995 the NTP has been able to maintain the high cure rate of over 85% for the past 13 years. The program attained the 70% case detection rate by 2005 as planned. Though the case detection rate of smear positive TB cases has slightly declined since then, the overall number of TB cases continues to increase, partly because of increased focus and capacity for diagnosing smear negative TB (18,892 in 2000, 36,121 in 2005 and 40,199 in 2009). In 2009, the NTP achieved a case detection rate of 62% for new smear positive cases and a treatment success rate of 94%.

72. Having started in 2003, good progress has been made in expanding TB/HIV collaborative activities to cover 74 of 77 operational districts in 2009. The fourth National Sero-prevalence Survey showed a further decline in HIV prevalence among TB patients from 11.8% in 2003 to 6.3% in 2009. The uptake of HIV testing among TB patients reached more than 70% and provision of OI/ART services for co-infected patients showed improvement. Additional initiatives to reduce the burden of TB among PLHA have begun with the development of TB-HIV clinical guidelines, the revision of National TB/HIV framework, and the standard operating procedures (SOP) for the three I's strategy (Intensified TB case finding among PLHA, Isoniazid Preventive therapy (IPT), and Infection control).

73. Considering the continued high burden of TB in the country, the main challenge is to consolidate, sustain and further improve the TB program for many more years, if not decades. This includes political commitment for continued priority for TB control, mobilizing adequate financial resources and a competent and motivated work force to implement the program over the coming years. Some of the specific technical challenges are summarized below:

1. **Community DOTS (C-DOTS):** As C-DOTS is assisted by around 10 partners, coordination and resources to maintain the activities among these partners are of critical importance.
2. **TB/HIV co-infection:** Despite the decline, TB/HIV co-infection continues to be high with 6.4% of TB patients testing positive for HIV in the 2009 survey. Intensified case-finding among PLHA, and INH preventive therapy are not widely provided in HIV services. In 2010, 20 OI/ART sites implemented three I's activities. Diagnosing TB among PLHA remains difficult because of limited access to culture facilities, capacity for clinical management of TB/HIV co-infected patients remains limited, and linkage between the TB and HIV programs needs to be strengthened further. Information system related to TB/HIV requires also further strengthening.
3. **PPM-DOTS:** Though promising, PPM-DOTS has not contributed to the case detection as anticipated. Other challenges include the high proportion of referred TB suspects that are lost during the referral process, and the need to expand at least to all urban areas, particularly for targeting pharmacies to effectively restrict the sales of anti-TB drugs.
4. **Laboratory capacity:** The management and technical capacity of the NTRL needs to be further strengthened to cope with demands for introducing new diagnostic technologies while addressing needs for ensuring quality of current services such as sputum microscopy, culture and DST services. Bio-safety of labs, particularly for those performing culture and DST needs to be ensured.
5. **Diagnostic issues:** Capacity for diagnosis of smear negative TB remains limited. Availability and quality of X-ray services need further enhancement and health workers related to these diagnostic activities need to be more motivated.
6. **MDR-TB:** The second National Drug Resistance Survey (NDRS) 2006-2007 indicated an increase in the number of MDR-TB cases. Current projects are still limited to 9 MDR-TB

treatment sites and second-line DST is not yet available in the country limiting the option for individualized treatment regimen.

7. **Infection Control (IC):** Following the development of general infection control guidelines by the MOH in 2010, the NTP has begun developing SOPs, implementation plans and training for TB-infection control that are aligned with MOH guidelines as well as the global guidelines.
8. A number of the health facilities, particularly TB (including MDR-TB) and HIV settings need to be renovated to minimize the risk of TB transmission. Orientation and training on TB-IC will be needed to increase awareness and prioritize implementation of TB-IC measures.
9. **TB in prisons:** Several surveys as well as routine data from ongoing activities indicate the high prevalence of TB in prisons as compared to the general population. Most of the prisons are yet to provide TB services; prison facilities do not have the infrastructure to separate infectious TB patients, thus there is likelihood of ongoing TB transmission. The SOP for TB in prisons is under development and will provide clear guidance on the way forward, including the role and responsibilities of concerned stakeholders.
10. **Childhood TB:** Diagnosis of childhood TB is possible only at the referral hospital requiring time away from work for parents and incurring transportation cost. Systematic contact tracing, including IPT for eligible children, is resource intensive as it requires outreach work, and the benefit of taking a 6-month course of treatment for a healthy child is not always understood making it difficult to implement on a wide scale.

c. Malaria

74. According to Institut Pasteur du Cambodge, the average malaria incidence in Cambodia is about 4 cases per 1,000 population and 100 deaths per year, relatively small compared to some other diseases. However, the malaria incidence is much higher in north-eastern provinces, with zero transmission in south-eastern provinces.

75. Malaria in Cambodia is a disease of young males 15-49 years of age. About 15% of cases in 2013 were adult females and children less than 5 constituted only 3% of cases. These are predominantly residents of villages in or near forests or are cases due to secondary transmission from forest goers that return to the towns and cities. Affected people typically live or work in forested areas or on private farms near the forest and they often travel between endemic and non-endemic areas; mobility can increase risk taking behaviors; poverty increases susceptibility; patterns are unpredictable due to changing land use; and sometimes illegal status leads to avoidance and reductions in care seeking behavior. These factors contribute to the high incidence of malaria amongst mobile and migrant populations (MMPs) when compared with a population of similar socio-economic and demographic profile.

76. Until 2011 *P. falciparum* was the predominant species among confirmed malaria cases but in 2012 the proportion shifted and for the first time *P. vivax* accounted for more than 50% of confirmed case: 55% in 2012 and 58% in 2013, which affects pathology and treatment. *P. malariae* is rare and *P. knowlesi* has been reported although its distribution and the number of human infections are not known. In addition, multi-drug resistant strains of *Plasmodium falciparum* are common, particularly in the west of the country, including artemisinin resistance, the last first-line treatment option. Multidrug resistant parasites represent a major threat to worldwide goals of malaria eradication.

77. The total number of treated malaria cases in the public sector, meaning all cases treated based on clinical as well as microscopic or rapid diagnostic test (RDT) confirmation in

government facilities reporting, was halved from 115,614 in 2001 to 74,166 in 2012 and was further reduced by 40% in 2013 to 44,203 with roughly half of the cases being tested and treated by the extensive network of village malaria workers (VMWs). At the end of 2013 the national malaria incidence was 2.94 per 100,000 and deaths had dropped to 12 compared to 46 in 2012 (a 74% reduction). In some areas the reduction has been even more rapid³⁰.

78. Malaria control is given high priority by the government and development partners because of the emergence of drug resistance. The Cambodian National Malaria Control Program (CNM), the Global Fund, WHO, and other partners have succeeded in reducing malaria incidence and mortality, and MDG goals are close to being achieved. This included malaria testing (blood smear), distribution of some 1 million impregnated bed nets, vector control, education and treatment. Malaria diagnostic is apparently more relevant to reducing mortality than to controlling transmission, so should be stepped up for children and non immune populations as close to their home as possible. However, some border areas have low population density and may lack health centers. While malaria elimination may not be possible, intensive malaria control should stop transmission in most provinces. Malaria surveillance will also be improved and few malaria indicators will be included in HMIS. The malaria program will maintain a separate program monitoring system using multiple indicators to monitor program effectiveness and efficiency, as also required by the Global Fund.

79. The current GF malaria grant expires in December 2017, and finances bed nets, case detection, treatment, and general support in hotspots. Long lasting impregnated bed nets supplied by GF cost \$2.30 each. Social marketing of bed nets is not encouraged nor offered by suppliers. The GF does not support mobile clinics, vivax control, supply chain, and participation of private clinics.

80. Goals of Elimination Action Framework for Malaria 2015- 2019 are as follows:

Short-Term Goal (by 2015): To move towards pre-elimination of malaria across Cambodia with special efforts to contain artemisinin resistant *P. falciparum* malaria.

Medium-Term Goal (by 2020): To move towards elimination of malaria across Cambodia with an initial focus on *P. falciparum* malaria and ensure zero deaths from malaria.

Long-Term Goal (by 2025): To achieve phased elimination of all forms of malaria in Cambodia.

81. To maximize malaria control activities in the context of the overall health system strengthening in Cambodia, the following challenges are to be addressed during the implementation of the elimination strategy:

1. As the village malaria workers are part of the network of Village Health Support Group, where possible scale-up of malaria services provided by these community volunteer workers will be piggybacked with services such as child survival interventions (ARI, diarrhea), community DOTS for TB and care of PLHIV, etc. to ensure there is not detracting from these equally important health services.
2. Training of DDF officers in enforcement of drug quality will not be limited to malaria drugs.
3. Decentralization of managerial responsibilities and supervision will be sector wide, not only for malaria provision staff.

³⁰ MOH Elimination Action Framework for Malaria 2015-2019 (October 2015)

4. Performance-based incentives are not limited to malaria activities of health center staff but rather increased provision and improved performance of all basic services. For example, incentives will be provided for provision for 24 hour health services.
5. Scale-up of border activities and cross-border coordination may start with a malaria focus with the hopes of expanding to encompass other cross-border health issues especially TB and HIV.
6. Successful public-private synergies as a result of malaria based activities will be shared with other programs.
7. Operational research, monitoring and evaluation and efforts to increase available data will take advantage of common platforms (facility-based surveys, household surveys, community based studies, etc.)
8. Increased communication links between CNM and the Central Medical Stores (CMS) to help to improve stream-lining of drug supply systems and information systems for other disease-specific drugs as well. CNM will work with other GF supported Principal Recipients (namely MOH, NCHADS and CENAT) and CMS to carry out an assessment of storage conditions, formulation and implementation of a storage improvement plan.

d. Dengue

82. Cambodia is one of the dengue-endemic and epidemic countries in the south-east Asian peninsula, and has been affected by a number of serious epidemics of severe dengue over the last decade³¹. Dengue poses a major burden of disease in Cambodia with major epidemics occurring in cycles of 3-5 years, and outbreaks occurring each year. Due to the definition of what constitutes an epidemic, international response is typically too late. All serotypes of dengue viruses (1-4) may be associated with an outbreak. Dengue is now more prevalent in suburban areas, perhaps due to suitable environmental conditions. As dengue spreads to rural areas, cases of severe dengue are being reported from remote rural areas. Consequently, the population at risk has increased from 3.5 million in the urban areas of Cambodia to almost 11 million. The magnitude of the public health problem in the country will continue to grow unless more effective measures are taken to reduce viral transmission.

83. In 1990 and 1995, there were major epidemics; 7241 cases (331 deaths) and 10,208 cases (424 deaths) were reported respectively. The worst year for dengue on record was 2007, when 39,851 cases with 407 deaths were reported (CFR = 1.03%). In view of the improved clinical management of severe dengue and increasing public awareness and timely health care seeking, the case fatality rate has steadily declined from more than 4% in 1995 to about 1% in 2007 and to 0.3% in year 2009. It is unlikely to decline much more, so dengue will continue to cause major mortality, in particular among young children.

84. Except for case management, the dengue control program has been considered as less effective, with late response to outbreaks and unnecessary wastage of incentives. The dengue control program is refocusing on early identification using HMIS and the dengue surveillance system, both based on syndromic reporting. However, the rapid test for dengue, costing about \$6, is in short supply. Not every patient needs to be tested during an outbreak. Provincial hospitals could test for dengue using Elysa but this is not done because it is less cost effective than the rapid test when small numbers of samples are being tested.

85. The key role of the NDCP at CNM is to provide technical leadership and to coordinate all activities related to prevention and control of dengue in Cambodia. The main responsibilities are to:

1. Formulate a national dengue control strategy for each of the program components, including Epidemiology, Entomology, Clinical Management and Health Education.

³¹ National Dengue Control Strategies (2013-2020) Ministry of Health, The Kingdom of Cambodia

2. Develop a comprehensive plan of action for emergency preparedness.
3. Lead for implementation, monitoring and evaluation of the control activities.
4. Collect, compile and analyze epidemiological data and feed the information back to the target provinces as well as to the MoH and health partners, including producing annual program reports.
5. Estimate the financing needs for program response, including the need for insecticides, equipment and medical supplies.
6. Conduct entomological surveillance, assessment and monitoring of vector control.
7. Design, test and produce health education and IEC materials.
8. Carry out operational research to develop and validate new vector control tools.
9. Organize training of health personnel in both public and private sector, on clinical, epidemiological, community and school based health education and vector control as a rapid response to dengue outbreaks.

86. The NDCP goal is to reduce the disease burden due to dengue and severe dengue to such an extent that they are no longer major public health problems and the overall objectives are as follows:

1. To reduce dengue mortality by at least 50% by 2020.
2. To reduce the morbidity of dengue by at least 25% by 2020.
3. To strengthen surveillance system for getting a reliable data on burden of the disease by 2015.

87. The national strategy adapted for dengue control in Cambodia is based on the WHO Global Strategy Framework and the newly formulated Regional Dengue Framework:

- To expand existing surveillance systems to include dengue case detection;
- To strengthen clinical management in public and private sectors, and promote early referral and hospitalization, and appropriate treatment;
- To guide the implementation of integrated mosquito control with community and inter-sectoral participation;
- To prepare emergency preparedness plan for responding to dengue outbreaks;
- To enhance public awareness; and
- To conduct vector control research.

88. In the implementation of the six elements above, the NDCP, through its four sub-committees, has formulated the following specific dengue control strategies for the next seven years (2013-2020):

- Improved clinical diagnosis and treatment of dengue
- Strengthening dengue program management and planning
- Epidemic preparedness and outbreak response
- Improved epidemiological and disease surveillance
- Selective and sustainable vector control using integrated vector management (IVM)
- Health education and community mobilization
- Strengthening operational research on dengue control.

e. Childhood Infections

89. The most common causes of deaths of children are common respiratory and intestinal infections. Respiratory infections often occur as regional epidemics including new influenza variants. While these infections as such usually do not kill, children often develop complications like pneumonia that does cause considerable case fatality, and requires access to health facilities with correct antibiotic and supportive treatment, which may not be the case. Diarrheal diseases continue to be associated with lack of clean water supply and sanitation, and poor

hygiene and food safety. These diseases also contribute to malnutrition and increased vulnerability of populations to other infections including tuberculosis.

90. While full immunization coverage in Cambodia is probably above 85%, there are pockets of low immunization coverage among ethnic groups where herd immunity is not achieved, hence there are outbreaks of measles and cases of tetanus and other childhood infections. Cambodia has achieved to control polio but there is a risk for the spread of polio from neighboring countries. A large cold chain network is in place reaching the health centers. The main issue for gaps in immunization coverage is probably lack of access, in particular during the rainy season. Financial problems and affordability of travel may also be considered. EPI will continue to be supported by GAVI and UNICEF. A regional vaccine supply facility is being considered.

91. Children not only get bitten by needles, mosquitos, flies, ticks, bees, ants, rats and other children, but also by snakes and dogs. While rabies and snake bite are quite common emergencies killing up to a thousand Cambodians each year, rabies vaccine and snake bite antiserum are not routinely provided by the Government to health centers, and only available in distant facilities. Both conditions are emergencies, and access to a facility with these medicines is essential. Some 6000 rabies vaccinations are needed by year and probably a similar quantity for snake bite antiserum. Problems in increasing access to rabies vaccine and snake bite antiserum are cold chain, wastage due to irregular demand, and high cost at \$80.

f. Neglected Tropical Diseases

92. NTDs are intensely transmitted in Cambodia. The NTDs in Cambodia that can be controlled or eliminated by preventive chemotherapy are as follows³²:

1. Soil transmitted helminthiasis (STH) that include ascariasis, trichuriasis and hookworm infection
2. Schistosomiasis (SCH)
3. Lymphatic filariasis (LF)
4. Foodborne trematodiasis (FBT) that include opisthorchiasis, clonorchiasis, paragonimiasis, fascioliasis, taeniasis and cysticercosis
5. Trachoma
6. Strongyloidiasis

93. Consequences of these infections include the followings:

1. Increased rate of malnutrition, especially among children and women
2. Reduced school performance in children
3. Reduced productivity in adulthood
4. Chronic ill health and liver disease
5. Cholangio carcinoma (due to opisthorchiasis)
6. Esophageal varices (due to schistosomiasis)
7. Blindness (due to trachoma)
8. Disseminated infection and death among immune suppressed (due to strongyloidiasis)

94. The groups at risk of each disease are:

1. **STH**: pre-school children, schoolchildren and women of child bearing age (WCBA)
2. **SCH**: People living along Mekong river in high risk focal ecological areas
3. **LF**: the entire population in 6 endemic districts (this group has now received 5 rounds of mass drug treatment and may no longer be at high risk)
4. **FBT**: children and adults eating raw food
5. **Trachoma**: the entire population in endemic provinces/districts, in particular young children

³² MOH Control of Neglected Tropical Diseases in Cambodia. An Integrated National Plan of Action focused on diseases controlled and eliminated by preventive chemotherapy 2011 - 2015

6. **Strongyloidiasis:** the entire population in endemic provinces/districts, in particular young children; mapping is yet to be completed
7. **For most NTDs:** those who live in poverty, usually with poor sanitary, eating and hygienic practices. Ethnic minorities and some occupational groups (e.g. fishermen for SCH and women farmers working in field for hookworm).

95. The main strategy to control helminthic NTDs is preventive chemotherapy, which is regular treatment of the population at-risk with anthelmintics and drugs - alone or in combination - according to the diseases targeted.

96. The LF elimination program in Cambodia has already completed five rounds of mass drug administration by 2009. The stop-MDA surveys to confirm that transmission no longer takes place in endemic districts have been completed in November 2010. The survey showed that the MDA can be stopped in all IUs. Cambodia now needs to transit to post-MDA surveillance.

97. The trachoma elimination program in Cambodia has also confirmed a medium level of endemicity but with pockets of high endemicity (as high as 20% in some places) in children under 10 years old. Only intermittent and limited focal control activities have been conducted due to resource constraints. The present challenge is to operate the backlog of TT surgery (~84,000 TT cases) in order to achieve elimination of blinding trachoma by the year 2015. Upon successful elimination of LF and effective control of schistosomiasis, Cambodia will be able to serve as a model country in the region.

98. NTDs are most often found in places with unsafe drinking water, poor sanitation and insufficient hygiene practices. Therefore, improvement of sanitary conditions and hygienic practices of the target population is an integral part of NTDs control intervention. Inter-sectoral linkages will be created between the integrated NTD control program and other programs that aim at improvement of sanitation and wastewater treatment (e.g. the Ministry of Education, Ministry of Women Affairs, Ministry of Agriculture, Ministry of Rural Development, FAO, UNICEF, UNDP, etc.). While the MOH, CNM and NEH take charge of medical and parasitological aspects of the NTD control program, the inter-sectoral network will make sure that the activities done by other programs and sectors for improvement of sanitation and agricultural practices target at NTD-endemic areas to exert simultaneous effects on elimination and control of NTDs.

g. Hospital Infection and Drug Resistance

99. Infection prevention and control (IPC) in hospital is important for three reasons. Hospitals often have the first cases of emerging diseases, and transmission often happens in hospitals, as was the case in MERS. Prevention of local outbreaks to spread is essential as no country in the world has large surge capacity for EID. Cambodia has about 30 designated quarantine beds and 1500 TB beds nationwide, in Phnom Penh and larger provincial hospitals, which can be used. Some of these were upgraded with earlier ADB support for SARS, but all lack equipment and safety features. The main purpose is to isolate suspected cases for further investigation. Transport of suspected case has also been prepared and simulation exercises are conducted yearly.

100. Hospitals also typically manage drug resistant cases following treatment of HIV, malaria and tuberculosis and other infections due to drug resistance. While reportedly drug resistance is still not a major public health issue in Cambodia, this may be because of lack of data, and in any case drug resistance, with current intensification of use of antibiotics, antivirals and antiparasitics is going up, and with few new drugs in the global research pipeline. Hospitals can be sources of the spread of these drug resistant infections.

101. The third important reason for IPC is that unhygienic practices among patients – often immune deficient – may create new superbugs for which no antibiotics work. This is already a major public health threat in the USA killing many thousands of people each year. Hospitals are ideal breeding sites unless IPC is strictly applied.

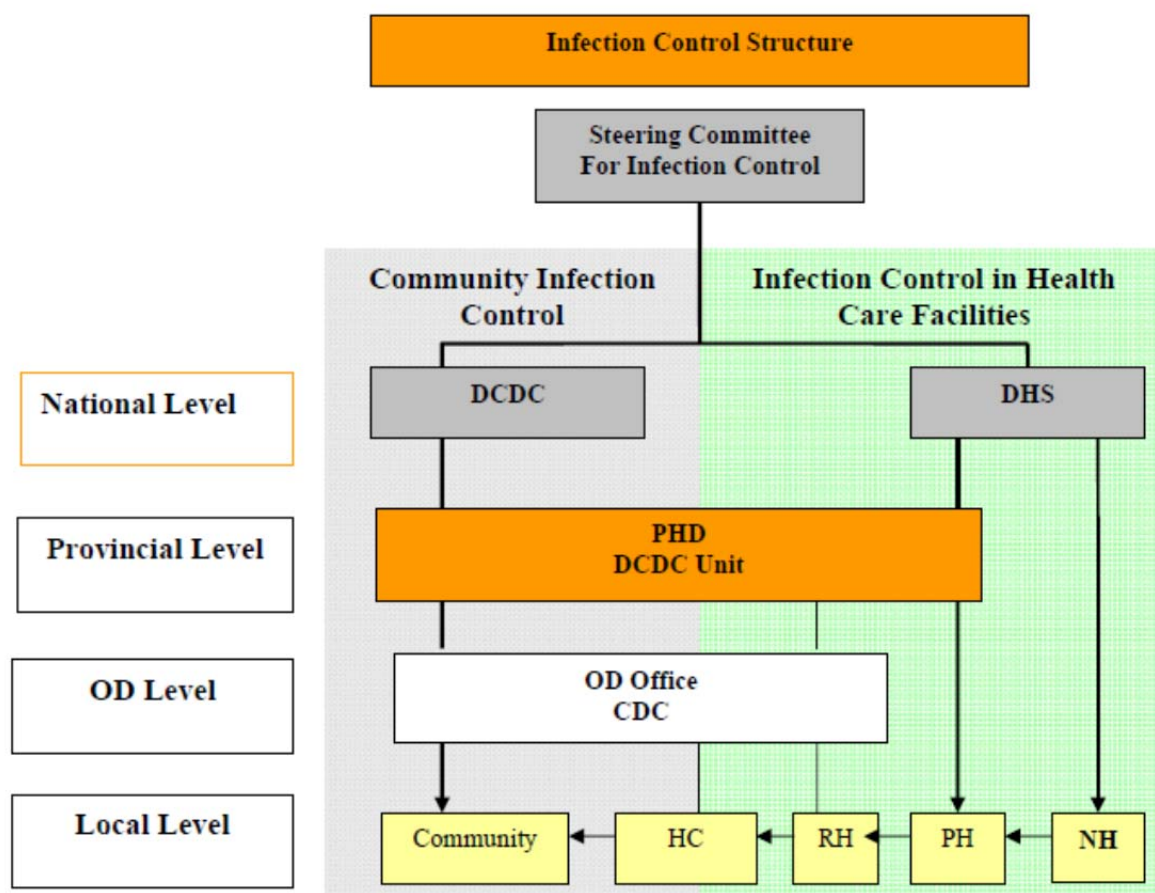
102. MOH is implementing IPC – infection prevention and control (WHO), in a phased manner based on APSED/IHR, to control general infections, emerging diseases, and nosocomial infections. About half of hospitals meet basic hygiene standards. A National Infection Control Policy 2009, a Prakas, and a national strategic plan for health care facilities (2011-2015) direct the roll out IPC. The plan lacks baselines and needs updating. Standards and guidelines have been prepared recently, including for use of antibiotics, handwashing, and waste disposal, but are only partly implemented. The initial target was national and provincial hospitals. The next phase is to improve IPC in district hospitals. Improving water and sanitation facilities in hospitals, as for example supported by the World Bank in Viet Nam, is needed in many locations. Hospitals have designated staff for infection control, but smaller hospitals and health centers still lack trained staff. Training also addresses general case management of EIDs but not for other infections like TB, AIDS and malaria, managed by disease control programs. Japan provides scholarships and USAID provides technical support in IPC. Funds for infection control should be included in HSP3.

103. Specifically for EIDs, designated staff are trained to identify potential EID cases among both OPD and IP patients. Protective gear, supplies and equipment including for waste disposal, such as autoclaves and incinerators, are lacking. Laboratory biosafety and bacteriology needs to be improved to test for drug resistance and nosocomial infections. Jointly with WHO, an infection control monitoring system is being set up. Accreditation of health facilities will also be subject to meeting infection control standards. There is a strong health security case for IPC support. Other areas of infection control outside hospitals may also need to be considered.

V. Infection Control Program

a. Management and Organization

104. The following diagram provides the overall management and organizational structure of infection control (IC) in Cambodia. It was agreed that the CDCD will be in charge of community IC as this can be ever changing based on the new epidemiological findings of new emerging diseases. Therefore, any additional training is to be added to the specific and related sections of the standard IC guidelines.



105. It is also worth noting that a referral hospital assessment tool was also developed in 2007 by the Quality Assurance Office of the MoH in collaboration with USAID-HSSC/URC and other health partners³³. This tool tests:

- Hospital management, administration, infrastructure and equipment
- Organization of wards and departments
- Documentation and recording of information
- Referral system
- Staff satisfaction and
- Good hygiene.

The tool has 14 sections (or more for CPA3) to be completed.

b. Surveillance and Response

106. The disease surveillance and response system is for a large part in place. It is managed by the CDCD, using the Cambodia Early Warning System (CAM-EWARN), which is based on reporting of suspected cases from all levels on weekly, or if needed, daily basis. It is separate from the monthly HMIS reporting which will incorporate some CAM-EWARN indicators. There are 10 notifiable diseases, including suspected dengue fever.. Web-based reporting is available from larger health centers upwards but there is a lack of funding for connectivity. The web-based HMIS is also being expanded to health centers and will include CAM-EWARN indicators.

107. Village representatives and volunteers carry out syndromic reporting of suspected cases using notes or text messages. While health center level upwards is to use reporting based on

³³ MOH: Referral Hospital Assessment Tool 2007

suspected diagnosis, this is largely unconfirmed at higher level and prone to error. Also if using rapid tests for diagnoses, case verification needs to be improved. Only few conditions such as HIV and tuberculosis require laboratory confirmation for each case, so some cost savings are possible for diagnostics for dengue and other diseases. MoH has an emergency response room with video conferencing facility to manage outbreaks with international partners. It plans to have this service also in the provinces.

108. Vehicles for outbreak response are in place, in particular in ADB assisted provinces. PPE is mostly old and insufficient to manage an outbreak. ADB CDC2 funds for outbreak investigation, about \$2500 advance per province, can be used in any province in the nation using the central imprest account, but is currently being used only in ADB targeted provinces that have their own account. Documenting, spot checking and liquidating the use of these funds needs to be improved. The Government and WHO also provide funds for outbreaks based on repayment of expenditures, but this is not a satisfactory arrangement. Provincial governments may have stand-by emergency funds for any disaster or outbreak.

109. The main EID role of public and private health providers is perhaps to identify suspected cases of dangerous infectious diseases, including those caused by drug resistant infections, and admit these in isolation wards. About 15 designated isolation beds are available in PP, and 14 beds in 7 regional hospitals close to airports and border crossings. In addition, there are some 1500 TB beds that may be used in case of an outbreak. Surveillance, investigation, and initial response functions require a trained workforce at all levels, from community to hospitals. WHO supports a 6 month training program in applied field epidemiology, which could be expanded to cover all provinces. A similar training of veterinary officers also needs to be scaled up in view of threat of zoonotic diseases.

110. The concentration of migrants and mobile populations (MMPs) in border areas is a cause of concern in terms of the spread of diseases, access to services, and drug resistance. For example, the International Organization of Migration (IOM) is screening for tuberculosis among deported migrants from Thailand. But many of these persons were already infected while in Cambodia, hence general TB screening also needs to be stepped up.

111. GMS countries have signed cooperation Memorandums of Understanding and discussed regional and cross border cooperation to respond to epidemics and the harmonization of treatments and services for MMPs. These initiatives need to be systematized and embedded in national policies and protocols. The arrangements for information exchange, knowledge management, and joint control are still in an early stage. Coordination of outbreak control among countries is still too slow. The Mekong Basin Disease Surveillance (MBDS) Foundation, ASEAN, and other networks support establishment of SOP for GMS outbreak control.

c. CDC in Border Areas

112. It is worth noting that in border provinces targeted under the ADB/CDC2 project, the timeliness of provincial reporting of CDC information on a weekly basis (Zero Report) is only 86% for Q3/2015 (see figure 2). Stung Treng and Kampot provinces reported 12 and 9 times consecutively later than the defined time. However, the proportion of disease outbreaks reported within 24 hours is 100%. Outbreaks reported in that quarter included outbreaks of dengue, food poisoning, suspected H5N1, suspected rabies, diptheria, mumps, and influenza.

113. Priority health problems in border areas are as follows:

- In remote areas, physical access to health facilities may be delayed even with the establishment of health posts, but in terms of timeliness of surveillance, digital disease detection and reporting may help with the expanded coverage of telephones networks. MoH

should take the advantage of these advances in telecommunication in the country. In 2011, there were 14.3 million connections combined for fixed and mobile, resulting in 93.1 connections per 100 persons. These far exceed the 2013 target of 11 million³⁴.

- In border areas with Special Economic Zones (SEZ) where garment and casino workers are concentrated, there should be an appropriate mechanism to capture and response to public health events. During the H1N1 pandemic in 2009, this target population was also provided with health education as the disease transmission is through respiratory route. While specific national programs may have their own activities for instance for HIV/AIDS or STI or prevention of food-borne diseases, health risks of these populations should be addressed comprehensively as a package as financial support are not readily available for all health programs.
- Referral of emergency cases could not be shouldered by the current number of ambulance available in nearby health facility based on current MoH support.
- Cross-border meetings involving local communities across the border as well as provincial health department and the provincial governors are to be held at least once a year to improve health collaboration. As the health sector cannot always be the lead convener, health agenda can be discussed as one of the agenda of inter-provincial meetings in other topic of interest usually chaired by the provincial governors.

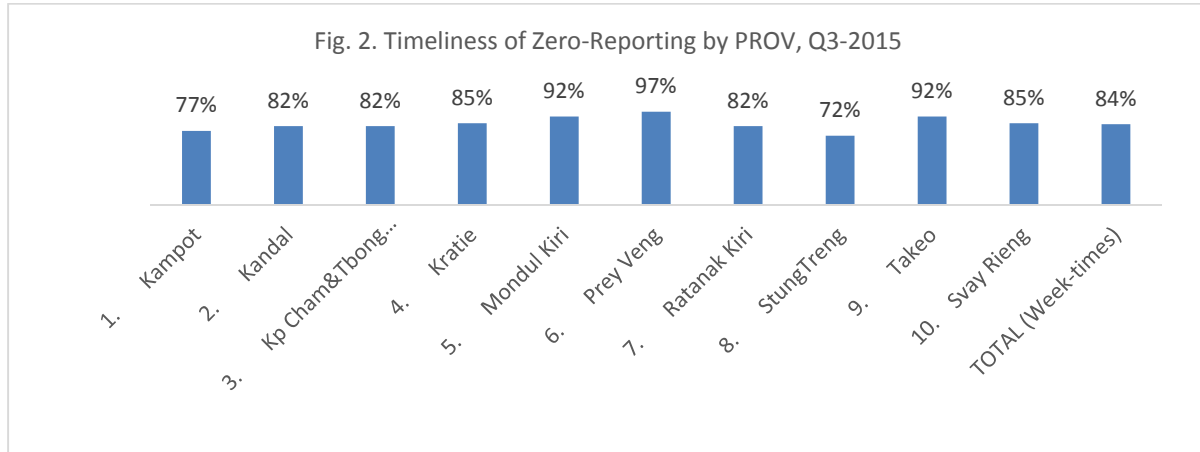
114. There are 23 language groups in Cambodia reflecting a varied group of ethnic people even though the Khmer language prevails³⁵. Along the border provinces, there are many gateways for accessing the neighboring countries. The establishment of Special Economic Zones (SEZ) along economic corridors, especially at border areas is also attracting an increased number of both local and migrant work-force within and between countries based on the technical skill requirements. Key challenges for CDC at border areas include inadequate health infrastructure and quarantine services, coordination of multiple disease specific cross-border initiatives and innovative planning approaches to meet the current pattern of population structure at border areas.

115. Border checkpoints are classified as *regional* (11 with Viet Nam, 13 with Thailand), *bilateral* (9 with Viet Nam) and *international* (12 with Viet Nam, 6 with Thailand and 1 with Laos) checkpoints. Only at the designated airports, ports and ground crossing are health quarantine staffs posted. A Sub-decree of Border Health Quarantine was recently signed by the Prime Minister on 17 September 2015 to reinforce health quarantine activities at border checkpoints. As clearly defined in the Annex 1(b) of the IHR(2005), each State Party to the WHO is required to meet the following core capacity requirements at all times at the designated airports, ports and ground crossings:

- (a) to provide access to (i) an appropriate medical service including diagnostic facilities located so as to allow the prompt assessment and care of ill travelers, and (ii) adequate staff, equipment and premises;
- (b) to provide access to equipment and personnel for the transport of ill travelers to an appropriate medical facility;
- (c) to provide trained personnel for the inspection of conveyances;
- (d) to ensure a safe environment for travelers using point of entry facilities, including potable water supplies, eating establishments, flight catering facilities, public washrooms, appropriate solid and liquid waste disposal services and other potential risk areas, by conducting inspection programs, as appropriate; and
- (e) to provide as far as practicable a program and trained personnel for the control of vectors and reservoirs in and near points of entry.

³⁴ Ministry of Planning, 2013: Annual progress report, Achieving the MDG available at: http://planipolis.iiep.unesco.org/upload/Cambodia/Cambodia_MDG_Progress_report_2013.pdf

³⁵ Ethnologue, 2005, available at <<http://www.ethnologue.com/country/kh/languages>>



116. For responding to events that may constitute a public health emergency of international concern, the required capacities are:

- (a) to provide appropriate public health emergency response by establishing and maintaining a public health emergency contingency plan, including the nomination of a coordinator and contact points for relevant point of entry, public health and other agencies and services;
- (b) to provide assessment of and care for affected travelers or animals by establishing arrangements with local medical and veterinary facilities for their isolation, treatment and other support services that may be required;
- (c) to provide appropriate space, separate from other travelers, to interview suspect or affected persons;
- (d) to provide for the assessment and, if required, quarantine of suspect travelers, preferably in facilities away from the point of entry;
- (e) to apply recommended measures to disinsect, derat, disinfect, decontaminate or otherwise treat baggage, cargo, containers, conveyances, goods or postal parcels including, when appropriate, at locations specially designated and equipped for this purpose;
- (f) to apply entry or exit controls for arriving and departing travelers; and
- (g) to provide access to specially designated equipment, and to trained personnel with appropriate personal protection, for the transfer of travelers who may carry infection or contamination”.

117. There are several networks and projects in the GMS to support health collaboration:

- WHO supports IHR implementation and planning and roll out of APSED and other biregional strategies;
- ASEAN excelling in the establishment of regional mechanisms for EID prevention and control;
- Mekong Basin Disease Surveillance (MBDS) Cooperation excelling in cross-border collaboration in disease surveillance;
- ADB’s GMS CDC2 supporting regional cooperation, surveillance and response, laboratory services, provincial training capacity building, and pioneering the “Model Healthy Village” in poor and hard to reach remote villages along 10 participating border provinces with Laos and Viet Nam;
- the Lower Mekong Initiative (LMI) is also a recently established mechanism and forum for building cooperation and capacity to narrow the development gap in ASEAN;
- Bilateral and trilateral Memorandums of Understanding between Cambodia, Thailand, Laos and Viet Nam;
- Canada Global Partnership Project (GPP) for health security;

- USA-led Global Health Security Agenda (GHSA) with 4 action packages for “Prevent”, 5 for “Detect” and 3 for “Respond”.

118. The GHSA is a new effort by nations, international organizations, and civil society to accelerate progress toward a world safe and secure from infectious disease threats; to promote global health security as an international priority; and to spur progress toward full implementation of IHR 2005, OIE Performance of Veterinary Services (PVS) pathway, and other relevant global health security frameworks. It may possibly provide a platform for regional coordination of aid towards GMS public health security. ADB’s regional coordination unit (RCU) may also be scaled up to provide more technical support for facilitating coordination for GMS public health security.

d. Laboratory services

119. The critical role played by **laboratories** on national, regional, and global health security has placed laboratory diagnostics as an essential component of the International Health Regulations (IHR)2005, which must be met by all 194 member states, including Cambodia.

120. The National Strategic Plan for Medical Laboratory Services (NSPMLS) 2010-2015 was developed to guide implementation of the National Policy for Medical Laboratory Services (2009) through priority activities aimed at strengthening the laboratory system. The National Laboratory Strategy (NLS) 2015-2020³⁶ will expand on the achievements of the NSPMLS 2010-2015 and will focus on eliminating existing gaps, strengthening priority areas, and ensuring sustainability of what has been accomplished during implementation of the NSPMLS 2010-2015. Development of this NLS 2015-2020 also benefited from evidence accumulated through reports, assessments and analyses of the laboratory system in Cambodia carried out in recent years. In particular, the findings and recommendations of a comprehensive assessment of the laboratory system and 22 laboratory facilities performed in 2013 have guided the development of this NLS 2015-2020.

121. This NLS 2015-2020 was developed through a series of consultation meetings with members of the Sub-Technical Working Group for Blood Safety and Laboratory Services, national stakeholders, and international laboratory experts between April and November 2014. Various documents were consulted during development of the NLS 2015-2020, including the NSPMLS 2010-2015, National Laboratory Policy for Medical Laboratory Services (2009), National Health Strategic Plan (2008-2015), laboratory program reports, a report of the National Assessment of the Laboratory System (2013) and its associated Gap Analysis (2014), Cambodia’s National Work Plan (2014-2016) for implementation of International Health Regulations (2005), and the World Health Organization’s Asia Pacific Strategy for Strengthening Health Laboratory Services (2010-2015). A preliminary draft was submitted for review through a consultative meeting in September 2014 attended by various stakeholders, including MOH officials, representatives from vertical programs, academic and research institutions, partner organizations, hospital directors and laboratory managers from 30 facilities at both national and sub-national levels.

122. The NLS 2015-2020 is divided in 12 sections:

1. Legal and regulatory framework
2. Organization and management
3. Public health functions
4. Laboratory services at health facility level
5. Human resources management and development

³⁶ MOH National Laboratory Strategy 2015-2020

6. Laboratory equipment and equipment maintenance
7. Laboratory commodities and distribution system
8. Biosafety and biosecurity
9. Laboratory quality management system
10. Laboratory information management system
11. Monitoring and evaluation
12. Financing and sustainability.

123. It is expected that Annual Operational Plans will be developed to allocate resources and ensure commitment of all relevant stakeholders. The Ministry of Health hopes that this NLS 2015-2020 will strengthen the delivery of effective, accessible, equitable and affordable quality laboratory diagnostic services to support both public health and clinical services in Cambodia. It is worth noting that for the sake of health security project, each of the 12 sections with their planned activities is to be considered for investment and support. However, the procurements of laboratory equipment with due consideration of other sections will be critical to effective and sustainable outcome.

124. Also an assessment and gap analysis of the National Laboratory System and Facilities in Cambodia was undertaken by US Centers for Disease Control and Prevention in collaboration with WHO between July 2013 and April 2014 to support the Ministry of Health (MoH) of Cambodia by initiating a systematic evaluation of their national laboratory system³⁷. This evaluation was designed to provide evidence based information to the government of Cambodia and its stakeholders on the national health laboratory system capacities and readiness to meet the International Health Regulations (IHR)2005. The findings benefit their decision making and investments in laboratory services; including patient care, disease surveillance, preparedness and response initiatives, and control programs. The WHO laboratory assessment and laboratory system assessment tools were incorporated. The cross-cutting and holistic approach makes these tools appropriate for assessment and monitoring of laboratory core capacities for the successful implementation of IHR. In addition, it provides a detailed gap analysis on which to build strong and sustainable interventions to strengthen laboratory capacity in support of detection and surveillance programs. The laboratory assessment tools were specifically designed to:

- Provide information in a standardized way and adapted to the local context on the organization and environment of health laboratories.
- Provide a snapshot of a representative sample of laboratories at various levels of the laboratory system.
- Identify strengths and weaknesses of the health (human and animal when applicable) laboratory system.
- Raise awareness of laboratories' performance at country level.
- Provide objective data to national decision-makers and stakeholders for planning and implementing laboratory capacity strengthening activities.
- Allow for monitoring and evaluation of progress over time.
- Provide guidance for the development of a laboratory implementation plan.

125. The assessment and associated activities were performed by Integrated Quality Laboratory Services (IQLS) as part of the US Defense Threat Reduction Agency's Collaborative Biological Engagement Program (CBEP) and CDC partnership in collaboration with WHO Cambodia. The key issues identified in the assessment report were consistent with topics covered in the national policy for medical laboratory services (2009), the national strategic plan

³⁷ Assessment of the National Laboratory System and Facilities in Cambodia: Gap Analysis

for medical laboratory services (2010) and the newly developed IHR implementation plan (2014-2016).

126. The gaps can be organized in the following categories:

1. Inadequate implementation of the regulatory and legal framework (i.e., the national policy for medical laboratory services) that supports the national laboratory system.
2. Ill-defined public health laboratory system and/or poorly communicated public health functions and its implementation processes.
3. Uneven infrastructure and distribution of resources.
4. Lack of standardized workforce development programs for laboratorians.
5. Weak quality management systems.
6. Inadequate Biorisk management programs.

127. The National Institute of Public Health (NIPH) (BSL2) is the referral laboratory for public and private health services and also manages the national public health laboratories including regional, provincial, and district laboratories. Pasteur (BSL3) is a research institute which also conducts diagnostic services in infectious diseases. Mérieux (BSL 2) also conducts training and research in infectious diseases. Food safety is the responsibility of the Ministry of Trade and Commerce, but NIPH also wishes to build up its food safety and toxicology investigation capacity (an ADB project supports commercial food safety in Laos and Viet Nam but not Cambodia).

128. Perhaps the major shortcoming in laboratory services is insufficient competent staff in the provinces, in part due to high private sector demand. Internal quality control and external quality assurance in both public and private facilities is weak, and so is biosafety. Routine testing for common infections and drug resistance is often not available.

128. A major disease burden and future public health security threat is antibiotic drug resistance, caused by indiscriminate over-the-counter availability and inappropriate use of antibiotics, even those intended for use in hospital settings by specialists. A related problem is low demand, both public and private for drug resistance testing, offered free by NIPH. Testing for drug resistance is available in few regional laboratories, and is proposed to be expanded to all provincial laboratories.

129. NIPH does routine virology (PCR) including for MERS and AI but not for SARS and EHF. Testing for other viruses is limited due to lack of biosafety facilities and reagents. Pasteur can also test for SARS and EHF, and is also focusing on rabies. Capacity to test for some emerging viruses is lacking as reagents are not being procured. Apart from this lack of reagents, and biosafety concerns, the current arrangement is satisfactory as there are few specimens to be tested for EDs, and initial workload in case of an outbreak can be handled. Once an ED outbreak is established, testing will be selective and supported internationally. Experts are not in favor of the establishment of a BSL2+ or BSL3 lab at NIPH in the short term in view of the low anticipated workload and high maintenance cost, in the order of \$50,000 to \$300,000 per year. The national animal health laboratory has a 2+ facility for the culture of viruses, including AI subtypes such as H5N6 causing new fatalities in China in 2015.

130. Six regional laboratories, close to international airports and border crossings, are being upgraded to do bacteriology with the help of CDC2. ELISA based diagnosis of dengue was established in regional hospitals but could not be sustained due to lack of competent staff, facilities, and reagents, and is probably not cost effective for the number of tests being performed. A sample transport system to NIPH is in place. This arrangement is considered satisfactory as there are few cases which may need to be tested at provincial level. Priority is to improve other provincial laboratories for bacteriology and testing for drug resistance, including for multidrug resistant tuberculosis.

131. District laboratories require performance of microscopy for malaria, tuberculosis and urine and stools, and hematocrit for dengue. Smaller hospitals may lack the facilities and staff to perform these functions. There is a general shortage of equipment and reagents. There are also plans to establish mini-laboratories for malaria, dengue (rapid test) and basic hematology, and urine and stool exam at larger health centers that can be provided with laboratory assistants. Staff constraints both in terms of quantity and quality are the major problem. Local testing for malaria and dengue would allow faster responses to outbreaks.

132. A laboratory assessment has been undertaken and a national laboratory plan has been prepared. Priority is to standardize test, equipment and management of laboratories nation-wide as part of internal quality improvement and external quality assurance program for laboratory services. USAID, JICA, US-CDC and INGOs provide some assistance in these areas. WHO and ADB also provide support. However, government funding needs to be increased to finance recurrent costs of laboratory services, in particular reagents and other supplies.

e. Hospital Infection Prevention and Control

133. The National Infection Control Policy was developed with due consideration of the current economic and technical capacity of the country and the need to keep abreast with advances in medical technology³⁸. The aim of the policy is to establish the foundations for an infection control program which includes:

- (i) A National Infection Control Policy and National Strategic plan
- (ii) Infrastructure in health care facilities that allows the appropriate and correct delivery of the National Infection Control Program including:
 - Health facility designs such as sinks for cleaning equipment or hand washing
 - Appropriate water and drainage system
 - Proper infection control system in operating theatres, wards, laundry, kitchen and isolation rooms
 - Standard equipment and quality supplies to ensure safe patient care
- (iii) A dedicated person(s) with responsibility for infection control in each facility
- (iv) Trained IC specialists
 - Healthcare workers need to be trained and educated in IC in order to deliver clean and safe care in line with National Infection Control Guidelines.

134. Once these foundations are in place, an IC Program can be implemented. The following programs of work can be viewed as the walls that are built on the foundations in order to deliver a clean, safe healthcare facility, including:

- (a) IC guidelines
- (b) Appropriate and adequate equipment and supplies
- (c) Environment in health care facilities (HCF) including clean water, waste water and sanitation
- (d) Waste management in HCFs
- (e) Collaboration and communication
- (f) Research and development
- (g) Training and capacity building
- (h) Diagnostic microbiological services
- (i) Prudent use of antimicrobials and safe injections
- (j) Monitoring and evaluation
- (k) Surveillance
- (l) Occupational health and safety.

³⁸ MOH National Infection Control Policy; December 2009

135. The policy will also establish and strengthen structures for IC at:

- National level
- Steering Committee
- Leading and responsible departments
- Provincial and OD levels
- Health care facility levels (national hospitals, provincial hospitals, referral hospital (CPA1, 2, 3), health centers, health posts, private clinics, and all national programs)
- Infection Control Team (ICT)
- Infection Control Nurses (ICN).

136. The IC Policy aims to enhance the overall quality of health service delivery by improving the culture of IC at all health care facilities and its main objectives are four fold:

- To establish effective and safe IC practices for patients and health care workers at all levels of the health care system and throughout the country.
- To ensure the appropriate allocation of funds to support effective and safe IC practices.
- To increase IC capacity in Cambodia to reach an optimum standard set by the Asia Pacific Strategy for Emerging Diseases (APSED).
- To involve relevant organizations in promoting and implementing effective and sustainable infection control.

137. This policy applies to all health care facilities that are within the jurisdiction of Ministry of Health. This includes all national hospitals, all provincial hospitals, all referral hospitals (CPA1, 2, 3), all health centers, all health posts, all private clinics, all consultation rooms, and all national programs. This policy also covers all IC in the community of the Ministry of Health. Other health care facilities that are beyond the control of Ministry of Health could use this policy to facilitate their respective IC programs. This includes health care facilities under the jurisdiction of Ministry of National Defense, Ministry of Interior, Ministry of Social Affairs Veteran and Youth Rehabilitation, Ministry of Education, Youth and Sport, Ministry of Labor and Vocational Training, etc.

f. Public Preparedness

138.. Public or community preparedness for symptoms of EIDs and other major and fast spreading infectious diseases such as cholera and dengue is a multi-sectoral responsibility. While Cambodia has national preparedness plans in place, these are insufficiently known and shared at community level. NGOs have been active in public education campaigns following SARS and avian flu epidemics but this effort is not being maintained. Hotlines managed by CDCD seem to be functioning well and are expanding their reach, in particular as every village now has access to the telephone network. However, there is probably a need to improve public preparedness in terms of how to handle suspected patients or outbreaks, in particular among at risk populations such as isolated ethnic groups in border areas and migrant workers from other countries. This needs to be assessed further by the CDCD.

g. Regional Cooperation

139. Regional cooperation has different rationales that need to be analyzed in terms of their merit and burden. Infections easily spread across borders, so exchange of information on suspected cases of notifiable diseases and timely outbreaks control of diseases is important. Some progress has been made in this regard, but progress has been slow due to the need to develop standard operating procedures for information exchange. MoH has made less effort than desired possibly due to sensitivities and other priorities. Other mechanisms for information exchange, such as through WHO and MBDS need to be improved to be meaningful for more

effective control activities. In many cases, provinces went ahead arranging local cross-border cooperation, often with support of the local governor.

140. Other reasons for regional cooperation are learning from each other, challenging each other to do better, joint leverage to get support, and economy of scale in working together. Among these, the first two have been important in the GMS CDC context, with numerous exchanges and workshops being held on a wide range of topics, providing exposure to program managers and challenging them to do better. Some of the knowledge management activities have been less effective, such as setting up community of practice. Importantly, future knowledge management activities should be geared towards GMS/ASEAN/AEC standards and development of evidence based strategies.

141. A regional cooperation unit based in MOH, Vientiane, currently provides support to the extended CDCII project and is likely to continue with support of ADB.

VI. MoH Plan and Project Priorities

a. MoH Plan

142. The Ministry of Planning of the RGC is integrating demographic shifts due to age structure and migration in development planning. Demographic and health implication of migration will include reduced fertility and changes in life style and environment which carry additional health risks, including STIs and road accidents for youth, and NCDs for older people. Even though the levels of HIV awareness is high, multiple-sex partners and unprotected sex is common. Other communicable diseases like dengue and tuberculosis will also need more attention. This requires adjustment of health services, including specialized services and geriatric care, and of health financing to reduce the out-of-pocket expenses of the elderly. Apart from recurrent hazards in large industrial settings including mass fainting, food poisoning, stampede and road accidents, a crowded setting is quite amenable for increased respiratory infections ranging from seasonal flu, tuberculosis and pandemic influenza. Public health implications of economic integration will also need to be considered.

143. The two essential and interdependent components of regional health security are national and regional platforms or mechanisms to adequately detect unusual public health events to enable a timely national and/or regional response. While the national component is mostly technical in nature, the regional component is mostly at policy level and must be sustained in light of complementarity as national health system development are at different stages of development among member countries.

At country level:

144. Even though surveillance and response may also be linked to other line ministries, the key roles of the MOH must be enhanced as assigned by the RGC.

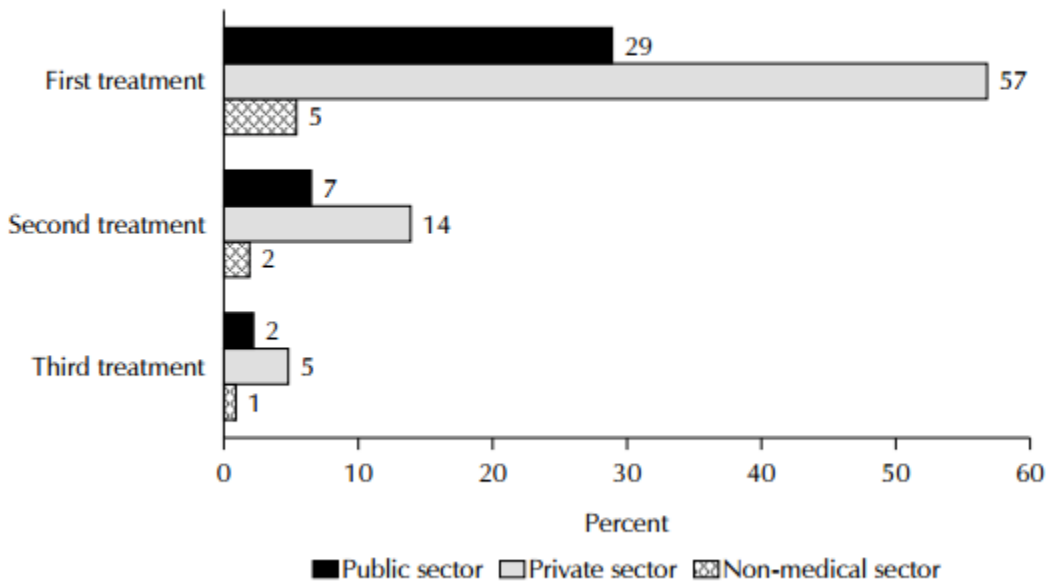
145. For surveillance, even though its timeliness and completeness are 100%, the mere collection of data from only public health facilities do not reflect the real and complete capture of public health events in the catchment areas as indicated in the two successive results of the Cambodia Demographic and Health Survey in 2005 and 2010³⁹.

146. The Cambodia Demographic and Health Survey (CDHS 2010) present data on utilization of health services by type of residence (urban-rural). Small differences in patterns of health care

³⁹ CDHS 2010 available at http://www.unicef.org/cambodia/Cambodia_DHS_2010_Complete_Report_Part1.pdf

use can be observed, with the private sector in general used most often, followed by the public sector and then the non-medical sector. Urban and rural residents sought a first, second, or third treatment in about equal proportions.

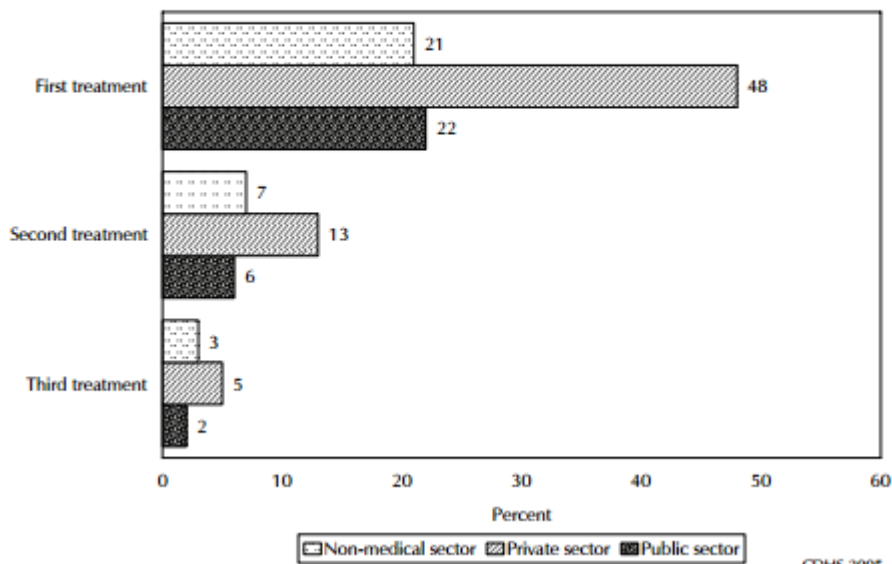
Figure 3.1 Percentage of Household Members Ill or Injured Seeking Treatment by Order of Treatment and Sector of Health Care



CDHS 2010

147. This pattern has not much changed in the past 5 years compared to CDHS 2005⁴⁰.

Figure 3.1 Percentage of Household Members Ill or Injured Seeking Treatment by Order of Treatment and Sector of Health Care



CDHS 2005

⁴⁰ CDHS 2005 available at http://pdf.usaid.gov/pdf_docs/Pnadi683.pdf

148. It can be argued that in the long run, the use of public health facilities will be increased, but the role of the private sector cannot be ignored and a clear mechanism of engagement should be set up rather than a request for voluntarily report under the Event-Based Surveillance (EBS). Also reaching out to other ministries could be systematic in mainstreaming the health situation of their staff under the umbrella of “*occupational health safety*”. This will allow a systematic planning with adequate cost implication from other line ministries to ensure that their core business could be continued even under the pandemic scenario (business continuity planning).

149. As indicated in the NSDP 2014-2018 of the RGC, strategic health components are clearly mentioned and the existence of specific strategic direction under APSED provides a good leverage for each GMS countries to move forward.

150. For surveillance and response activities, building in-house capacities for field epidemiology is a good and sustainable investment especially for participating provinces. The trainees should be first focused at provincial level to be followed by Operational District level which is better fit with the relatively rare major public health events if compared to commune level. Without a critical mass of field epidemiologists, epidemic surveillance and response cannot be effectively managed.

151. As some other key capacity areas are critical to support IHR/APSED, only the gaps in specific areas under the regional health security scope and not the whole area per se are to be supported by ADB. The basis for priority actions are already indicated in the above-mentioned assessment.

At regional level:

152. Cross-border collaboration is key to materialize regional collaboration in disease surveillance. The main comparative advantage over the traditional national structure (of reporting from the affected community to the health center level and then to the district and provincial levels before reaching the national level) is a more timely information exchange and joint outbreak response based on mutual trust and mutual support across borders. Health collaboration across borders can also be considered as a mitigation mechanism among community members in post conflict situation.

153. Another comparative advantage of cross-border collaboration is a possibility to timely mount a joint outbreak investigation without always requesting the approval of the national level as there is already a supporting mechanism, for instance the MBDS. Sharing of national capacities across borders in time of crisis is possible in case of emergency situation. This will include patient referral, lab testing or sharing personal protective equipments (PPEs) across the border.

154. MOH has made progress with regional information sharing and cross-border cooperation for CDC. However, this needs to be mainstreamed and formalized. In addition, some groups of MEVs that are more likely to get and spread infectious diseases are not using regular health services. Under the first output, the Project (i) supports regional, cross-border, and inter-sectoral information sharing and coordination of outbreak control among GMS countries, (ii) develops regional disease control strategies and evidence-based CDC, and (iii) improves CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for joint planning and monitoring; and outreach and community mobilization to reach and engage MEVs.

155. MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis is strong. However, the system needs to be further computerized and extended to communities by employing syndromic reporting. Linkages or integration among surveillance systems will also be improved. MOH also needs to improve capacity for disease outbreak response. Under the second output, the Project supports (i) syndromic reporting at community level, (ii) web-based reporting including information technology support, (iii) integration of surveillance systems, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport, and (vi) improving screening and quarantine capacity at border posts of entry and international quarantine centers. Support is needed for system design, computers, training, and vehicles and equipment for outbreak control.

156. District facilities are unable to comply with internationally acceptable levels of biosafety or to guarantee the accuracy of their laboratory testing. Underlying problems are substandard training of laboratory staff, lack of quality control, and insufficient facilities, equipment, and supplies. The quality assurance system is in a nascent stage, and there is no effective national laboratory audit system. Nosocomial or hospital-acquired infections are becoming a major public health problem. Under the third output, the Project supports (i) improving quality assurance, (ii) in-service training, (iii) improving district laboratory services, and (iv) equipment and training for infection control and case management of dangerous diseases.

b. Financing and Cooperation

157. Health system strengthening is largely done through the HSP, supported by the Government for about 75%, and a consortium of partners. For the next 5 year HSSP, the total cost is estimated at \$350 million per year. The Government will contribute about \$270 million per year. While no firm donor commitments have been made, about half of the funding gap of \$80 million is anticipated from the current SWIm partners including AusAID, GTZ, KFW, KOICA, UNICEF, UNFPA, WHO, World Bank, ADB, and other partners. The Global Fund has indicated to reduce its support to Cambodia health sector for about 50% in the next 3 years. The GF will support health systems strengthening including human resources development, health information systems and financing, for a total of \$3.5 million in 2016/2017. DFID is phasing out and AFD has phased out. USAID and Japan will continue to provide separate funding.

158. Important elements of health system strengthening for health security are efforts to improve access to services in border areas, and thereby to CDC, improving staff capacity, HMIS, improving supplies, provincial planning and training capacity, model healthy villages, and the flow of funds. These will need to be appraised.

159. Major partners for APSED/IHR implementation are WHO (technical partner of MOH), USAID (which also supports the animal health sector), the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), the Global Alliance for Vaccine and Immunization (GAVI) (immunization), ADB (CDC), and the World Bank (Health System Strengthening and Avian and Human Influenza Control and Preparedness Emergency Project). Other UN agencies also contribute to disease control, in particular HIV/AIDS. Bilaterals also play an important role in providing both technical and financial assistance, including scholarships. Other partners contributing to the development of surveillance and response capability in Cambodia include the Australian Government through ASEAN+3 EID projects Phases I and II, the Canada-Asia Regional Emerging Infectious disease (CAREID) project, the Rockefeller Foundation through the Mekong Basin Disease Surveillance (MBDS) Cooperation for regional disease surveillance and the South East Asia Field Epidemiology and Technology Network (SAFETYNET) for Applied Epidemiology Training (AET).

160. USAID has started to prepare a major health sector program. The “PAD” is expected to be approved in June 2016. The total amount is estimated at \$38 million per year, including surveillance and response for emerging infectious diseases, HIV/AIDS, malaria, tuberculosis, mother and child health/family planning, reproductive health, nutrition, and health system strengthening. USAID already supports animal health and IPC, and laboratory services through CDC Atlanta. Japan also plans major support to the health sector.

c. Proposed Project Scope and Issues

161. In Cambodia, the Project is part of the SWIM of the Ministry of Health (MoH) to achieve universal health coverage (UHC) including regional public health security. However, the funding mechanism will be separate from the pooled program funds. The Project will support HSSP3, in accordance with the upcoming Cambodia Third Health Strategic Plan 2016-2020, and relevant national laws, policies, and strategies including for disaster preparedness, CDC, health services, and community health development. In the GMS, it is to support the Asia Pacific Strategy for Emerging Diseases (APSED) 2015 and other regional strategies such as for the control of HIV/AIDS, tuberculosis, malaria, and dengue, and the strengthening of laboratory services. Internationally, it is to support implementation of the International Health Regulations (IHR)2005 of the World Health Organization (WHO) and other related agreements and networks.

162. The proposed project goal is averted morbidity, mortality, poverty, and economic impact due to emerging infectious diseases (EIDs) and other communicable diseases of regional relevance in the GMS⁴¹

163. The proposed project outcomes are (i) CLMV public health security system strengthened, and (ii) timely and effective control of EIDs and other communicable diseases in targeted border areas and economic corridors in CLMV countries, including for migrants and mobile populations, ethnic minorities, and other vulnerable groups (MEVs).

164. The proposed Project outputs are as follows:

- (i) **Strengthened regional, cross-border, and intersectoral collaboration and CDC in border areas and along economic corridors, in particular for MEVs.** MOH has made progress with regional information sharing, cross-border cooperation, and knowledge management. In border provinces, MEVs equally or more at risk of infectious diseases are not being reached with regular health services, in part as public health offices are not directly responsible for health services in factories and casinos. MOH noted that CDC, and basic health services in general, are difficult to provide in remote border areas as staff benefits do not match local living conditions and costs in these locations. MOH want to extend government services to reach MEVs in border areas, which will require cooperation with the Ministry of Labor and Vocational Training and others. Under this component, it is proposed that the Project supports (i) regional, cross-border, and intersectoral information sharing and coordination of MEV services and outbreak control among GMS countries (ii) harmonization of regional, cross-border, and intersectoral surveillance and control strategies, (iii) regional capacity for evidence-based CDC, and (iv) improved CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for information systems, technical forums, services for MEVs including mobile clinics, and vector control measures.
- (ii) **Strengthened national disease surveillance and outbreak response systems for CDRRs in targeted provinces.** MOH has a functioning surveillance system for

⁴¹ CDRRs include EIDs, HIV/AIDS, malaria, tuberculosis, dengue, fevers of unknown origin, diarrheal diseases, other respiratory infections, measles, polio, other childhood infections, and Japanese Encephalitis.

notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis are strong. However, the system needs to be more computerized and deepened to reach all health centers and perhaps communities, e.g. with syndromic reporting. Linkages or integration among surveillance systems and with HMIS/DHIS should also be considered. MOH also has capacity for disease outbreak response, at central, provincial, and district levels, but it needs to improve preparedness and response capacity. Under this component, it is proposed that the Project supports (i) strengthening syndromic reporting at community level, (ii) computer and web-based reporting including information technology support, (iii) integration of surveillance, HMIS and registration systems, including linking clinical and laboratory surveillance, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport and personal protective equipment, and (vi) improving capacity of border posts to identify and handle CDRRs. Support is needed for system design, IT equipment, staff and village health worker training, field epidemiology training, simulation exercises, outbreak response vehicle and equipment.

- (iii) **Improved laboratory services and hospital infection prevention and control.** Provincial health facilities are lacking in terms of laboratory quality and biosafety. Pre-service and in-service training of laboratory staff are insufficient. The quality assurance system is in a nascent stage, and there is no national laboratory audit and certification system. MOH needs to expand its capacity for diagnostics of CDRRs, drug resistance, food poisoning and toxicology. Only few major hospitals and communication hubs have capacity for managing suspected cases of emerging diseases, including preparedness plans, patient transport arrangements, and quarantine facilities. Second, to reduce hospital infections and potential spread into the community, the WHO hospital infection prevention and control (IPC) program is being rolled out. Priorities are daily infection control management and focal points and ensuring basic facilities for cleanliness, personal hygiene, and waste management. While case management for HIV, malaria and tuberculosis is well established, case management of infectious diseases including EIDs, dengue and childhood infections need to be improved. Under this component, it is proposed that the Project supports improvement of (i) laboratory biosafety and quality of services, (ii) pre-service laboratory training program, (iv) laboratory quality assurance system, (v) analyze causes of CDRRs, drug resistance, and other public health hazards, (vi) general infection prevention and control in hospitals, and (vii) case management of specific diseases (e.g., Dengue). Support will be provided for laboratory assessment, standard operating procedures, staff training, laboratory equipment, transportation of specimens. Additional supplies, e.g., diagnostic equipments and rapid tests for HIV, tuberculosis, malaria, dengue, and other neglected emerging diseases will also be needed.

165. Linked to the overall GMS project scope, 3 clusters in 13 provinces have been identified, in the north-east (Preah Vihear, Stung Treng, Rattanakiri, Mondulakiri, Kratie), in the south-east (Kandal, Svay Rieng, Prey Veng, and Tbong Khmum, Kampot) in the west (Banteay Meanchey, Battambang and Pailin). Districts are selected based on (i) border area/economic corridor, (ii) presence of hotspots/uncovered population including MEVs, and (iii) availability of external assistance. Within the border districts and along economic corridors, hotspots and population that do not access services will be identified. Selection criteria will also consider cost-effectiveness of reaching and having impact on these MEVs. Variations in population, disease patterns and services will require different responses, e.g., districts may have more malaria, dengue, HIV or tuberculosis depending on location. Also, district implementation capacity varies considerably. The proposed project should support a customized bottom-up district and provincial planning approach as part of the regular annual planning process. A range of

interventions may be chosen based on disease priorities, health services capacity, and funding constraints.

d. Proposed Project Management and Issues

Proposed Project Management

166. In Cambodia, the Project will be implemented by MOH through DPHIS representing the Executing Agency, and CDCD, DHS, and NIPH and 13 provinces in the north-west, north-east, and south-east as implementing agencies. The Project will be implemented over a period of 5-year period beginning early 2017. The project completion date is 30 June 2022.

167. The MOH steering committee will guide national project implementation. MEF will manage the imprest account and MOH and provinces will manage subaccounts. Selected national institutions and provinces will be implementing agencies (IAs). However, targeted provinces will largely implement the project through their regular divisions, rather than setting up PPMUs. Each province may need a program officer and an assistant accountant. Major procurement will be done centrally.

168. The advisory regional steering committee will guide regional coordination and activities and advice on project implementation. It will be hosted and chaired by each country on rotation basis. The regional coordination unit (RCU) to support regional activities is currently hosted by MOH Laos, and may be continued with grant financing, or moved to another country⁴².

169. The project modality is proposed. However, the Project will not be a self-standing intervention, but help the government strengthen the regular public health system through its various programs such as regional cooperation, border area health services, surveillance and response, infection prevention and control, and laboratory services. The Project will build on earlier support for CDC, and support current policy and health system development.

170. As mentioned above, a district and province-customized approach is proposed to ensure effective and efficient investment. Each province will, as part of its regular annual health plan, propose project investments including for MEVs, and gender and social dimensions, based on the agreed scope; and staff capacity, facilities, and recurrent budget support. Assessment, planning and approval of these plans will be done in phases in view of limited central capacity for staff training, procurement, and commissioning of equipment.

171. MOH has demonstrated capacity to procure goods and services at national level, although the process is slow. Most equipment to be purchased will be for provincial health laboratories and outreach services. The PMU should engage competent, mid-career national health professionals to work as project managers. Given a ceiling on the salary of national consultants, contracting a firm to provide technical support is to be considered. The Government needs to ensure adequate government leadership in the central PMU.

172. Financial management in the provinces has improved substantially under the increasingly devolved set up through Operational Districts (ODs). However, MOH proposes HSSP to be in charge of financial administration and provide provincial oversight.

Past Project Performance

173. ADB has assisted IHR/APSED implementation and CDC in the GMS since 2000. The first GMS Regional Communicable Diseases Control (CDC) Project, 2004-2009, and the Second

⁴² In the first CDC project, the RCU was based in Hanoi.

Regional Communicable Diseases Control (CDC2) Project, 2010-2015 focused on (i) strengthening the national communicable disease surveillance and response system; (ii) improving laboratory services, (iii) control of dengue and neglected tropical diseases (NTDs), (iv) provincial capacity building in planning and training for CDC, (v) community-based CDC in border districts, focusing on lagging villages; and (vi) strengthened regional cooperation capacity for CDC. Currently ADB also provides GMS support for malaria and HIV control, food safety, and improving resilience to climate change. The ADB Regional Malaria Initiative supports GMS capacity building and artemisinin-resistant malaria control.

174. Lessons learned from previous CDC projects include the importance of (i) targeting vulnerable groups, in particular MMPs; (ii) strengthening diagnostic and treatment capacity in the remote provinces and districts; and (iii) improving rapid response to and management of epidemics. CDC1 was evaluated as satisfactory. ADB support for the GMS Health Security project will also depend on good performance in CDC2 and HIV projects.

175. CDC2 is generally doing well in surveillance and response, although with some bottlenecks, such as in logistics and financing outbreak response in non-ADB assisted provinces. Laboratory services in 10 provinces are being improved and expanded with microbiology. Dengue control will need to be decentralized if it is to be made more effective. Deworming has high coverage. The model healthy villages sub-output, after a slow start, is rolling out and provides important insights into CDC at community level in border areas.

176. CDC2 is facing several problems that may require adjustment of scope. The CDC2 provincial training capacity sub-output was designed to address ad hoc training programs by building provincial training capacity. Provinces were to form a training committee, make a data base of staff, and identify and train a pool of teachers. However, this was not feasible and the current focus is on teacher training and curriculum reform. Few DMF indicators of CDC2 may also need adjustment as these are difficult to monitor. Due to MOH staff constraints, the PMU is staffed by consultants not engaged in MOH departments. This creates accountability and implementation problems. Lastly, regional and cross-border cooperation is reportedly making less progress in agreeing on standard operating procedures for information sharing and cross-border disease control.

177. CDC1 and CDC2 had a broader focus on other diseases of regional relevance, as well as addressing gaps in provincial capacity, and reaching out to border villages. Health security cannot be achieved without health system strengthening. While this is largely addressed through other sector developments, specific gaps may need to be addressed that particularly affect health security, such as improving sector monitoring systems, and improving access to health services/CDC in hotspots.

e. Gender, Safeguards and Risk Management

Gender

178. The proposed project's gender categorization is "effective gender mainstreaming." A gender analysis and action plan was prepared as a separate document.

179. Gender variables are important for understanding the spread of communicable diseases, as well as designing and delivering appropriate communicable diseases prevention, control, and response. Women and girls may have specific health care needs compared to those of men and boys, as is most obvious in the context of sexual and reproductive health. Men and women may also have different vulnerability to infectious diseases depending on how they are exposed through their different gender roles in households and productive activities, and/or they may

have different levels of access to, or understanding of, information about disease prevention and treatment.

180. As for *institutional gender concerns*, these are generally related to the gender equality and gender balance of health sector staffing at all levels, and to whether or not the gender policies and targets of the MOH are being implemented. Although the majority of health sector staff may be women, they are more concentrated and mainly represented in lower-level service delivery than in leadership, decision-making or technical roles in the health sector⁴³. Often the highest positioned staff, the majority being men, will “capture” opportunities for capacity building and regional workshops, themselves, - although their female colleagues, and lower ranking staff of both gender may need training more.

Migrants and Mobile People

181. Migrants and mobile people in border areas and along economic corridors often work in agriculture, industry and services. This includes mostly foreign owned plantations, small factories, and casinos. Most unskilled labor are Cambodian citizens. While many are recruited locally, and return home after work, many are internal migrants living in labor camps with often poor living conditions and high risk behavior such as poor nutrition, casual sex and use of drugs and alcohol. Factory conditions are sometimes poor resulting in group fainting. Cases of financial or in kind exploitation of laborers are reported. Transport of laborers is also done in old vans and trucks posing high risk of road accidents. Skilled workers are often from abroad, in particular from China, Thailand, and Viet Nam, and, being out of their social environment, may also be more inclined to indulge in high risk behavior including smoking, injecting drugs and unprotected casual sex. Overcrowding and chronic respiratory infections in factories and casinos may in particular be favorable to the spread of tuberculosis. Migrants often do not use government services, but instead purchase over the counter medicines, which is contributing to the development of drug resistant infections.

182. Migrant workers in plantations, factories and casinos have less access to services. The companies often employ their own staff providing basic clinical care for those who fall ill and cannot work. Labor conditions for laborers not to report illness. More comprehensive medical services including maternal and child care is usually not offered in these facilities, for which patients are referred to a nearby public or private services. The Ministry of Labor is responsible for inspecting these facilities based on labor standards, rather than medical services. Provincial health authorities mainly get involved during outbreaks.

183. Different sub-categories of migrants and mobile population are exposed to different diseases, and the risks may or may not vary according to gender. Female and male mobile, border area sex-workers, long-distance truck drivers, workers in the entertainment sector, mobile road workers as well as victims of cross-border trafficking are especially at risk of being sexually abused and infected with STD, HIV/AIDS, and TB - whereas, for example forest or agriculture workers, miners (mobile or residential) are especially exposed to malaria, TB and dengue, - but also STI.

184. Factory workers/workers in industrial zones are at risk of all kinds of communicable diseases, since they work in a closed and crowded environment, mostly indoor. They may or may not have access to health care within their work environment, depending on the factory type and management and whether their employers follow the ILO and Labor Law rules or not. Generally, migrant workers, - especially the unskilled, low-paid, seasonal and short-term, unregistered/irregular workers (in border areas and everywhere) - reside in areas with poor

⁴³ Evidence/ (baseline) data on MOH staffing at all levels is being collected.

hygiene; poor water management and sanitation, and not necessarily near a health center (in near factory premises, road side worker camps, construction sites etc.).

185. Although improving the province or district hospitals and labs or even the commune health centers will give patients better *quality* services, - there is no guarantee that all vulnerable groups in near-border and remote border areas (EM, migrants and mobile populations) will automatically benefit from such investments and have de facto access.

186. MMP face numerous constraints to accessing health care facilities, - including lack of awareness, lack of information, low confidence in “modern” medicine and/or reluctance to pay-out-of-pocket for services/medicine, remoteness, language barriers, lack of time for travelling to the clinic / loss of salary and high opportunity costs, and lack of cheap transport means, and the risks of being fined or deported, if they are irregular and non-registered workers.

187. Whether the free health care under the Health Equity Fund reaches and truly benefits the poor in all corners of a province is questionable, some poor in remote hill areas still have to travel far and pay for transportation themselves, and the elderly or very ill do not travel outside their village, if there is no road access.

188. Health insurance coverage for different groups with different schemes is yet to be designed and rolled out in Cambodia. Apparently, only registered and long-term contract-based workers in industrial zones / formal workers have access to health insurance, in some of the industrial zones. Future cooperation between the MOH and a National Health/Social Insurance Office is recommended.

189. For increased outreach to above mentioned migrant worker groups, there seems to be scope for increased cooperation and signing of MoU between the PHD and the provincial Department of Labor for mainstreaming awareness about and protection against communicable diseases as part of occupational safety and health (OSH) inspections and measures in local industrial zones and factories, in plantations or forests or among mobile road workers’ in their living quarters, sex-workers/dancers/entertainers in the hospitality sector/casinos, “red light districts” at the border check-points, among truck drivers at the lorry parking on the border check-points, migration and army staff - through “*mobile CD awareness and prevention services*”.

190. OSH inspectors have legal access to industrial zones and all other work places (even foreign owned factories) and a mobile health team could join inspection visits at the work places and take the opportunity to campaign for protection and prevention of STI, malaria, dengue, T-B, avian flu, diarrhea etc. and do free health checkup of workers in their respective work places, simultaneously.

191. As for the Cambodian-Thailand border check-point at Poipet in BMC Province, there seems to be some cooperation and regular meetings between Cambodian and Thai border authorities, and between the PHD/Health departments of the border provinces on each side of the border. The temporary health post at the border (outdoor, at the passage to migration) seems inadequate to capture potential high-risk groups. The consultant team was not shown the indoor migration health scanners.

192. Moreover, apparently, the IOM is running a migrant resource center at the Poipet border, and is pro-actively targeting the workers who are returnees / deportees from Thailand and doing free TB tests. Also the IOM is working in the migrant workers’ home communities in the near border areas, to test relatives and run prevention campaigns on TB and HIV/AIDS.

193. The work of IOM-Cambodia and their health services for migrant workers being deported from Thailand / returnees seems highly relevant in Cambodia (and other ASEAN countries), since most labor migration, in the region and cross-border, seems to be unregistered and seems to take place outside the border check-points and migration services. The services related to TB check-up and treatments, by IOM, could possibly be scaled up to other border areas in other border provinces, and scaled up, technically, to also include services / check-up and treatments for other CD, such as HIV/AIDS, malaria, dengue.

194. Moreover, the GMS Health Security Project will have to focus on cross-border migrants in near-border areas, primarily, although in Cambodia, apparently, most migrant workers found in border provinces (and elsewhere) are Cambodian workers, thus, so-called internal migrants. Apparently, and according to informants met, very few Vietnamese, Laotians, and Thai workers work in Cambodia. Labor migration is dominated by Cambodian workers of both gender, seeking work in Thailand (or, but less, in Viet Nam).

195. Gender and MMP aspects of CDC should be mainstreamed in cross border cooperation with Myanmar, Thailand, Vietnam and Cambodia; whatever the theme of the given cross-border meeting or workshop. Gender balance of workshop participants should be achieved.

196. For the GMS Health Security Project, the MOH could preferably aim at increased appointment of female technical staff and female leaders at all levels of health services in selected border provinces; first priority to natives of each province, with equal qualifications; - and consideration of specific incentives for female staff, such as "hardship allowances", free child care, work opportunities for spouses, if desired, etc.

Ethnic Minorities

197. Ethnic minorities in the proposed project areas will be positively affected given the type of project activities. The proposed project is initially categorized B for indigenous people. An ethnic group development plan was prepared.

198. About 90% of the population of Cambodia belongs to the Khmer ethnic group, and about 10% to ethnic minority groups. About 5% of these ethnic groups are economically fully mainstreamed and non-poor Chinese, Vietnamese and others. About 5% of the ethnic minority groups are indigenous people referred to as Khmer Loeu or upland Khmer, including Mon-Khmer Kuy and Tampuan tribes, and Cham Rade and Jarai tribes. They mostly live in the hills of Ratanakiri, Mondulhiri, Stung Treng, and Kratie provinces.

199. These indigenous groups are often poor and have higher mortality and morbidity rates mainly due to maternal and nutrition problems and a higher burden of communicable diseases such as acute respiratory infections, diarrheal diseases, tuberculosis and malaria. Major determinants are less education, poor living conditions, lack of clean water supply and proper latrines, and poor access to affordable and acceptable quality health services. Antenatal care, skilled birth attendant and immunization coverage in these groups are very low.

200. Although the risk of outbreaks of some communicable diseases may be less in remote, isolated, villages than in densely populated areas, there is a risk that diseases go unnoticed and unreported, in particular important for emerging infectious diseases. These groups may also be more vulnerable to outbreaks of emerging and other diseases of regional relevance as they often move around, including across border. However, the bigger risk may be that these communities are more isolated and less likely to report any outbreak to authorities.

201. Therefore, of equal importance to equipment investment for reducing CD is *outreach* to high-risk groups and communities, for awareness, information, protection, prevention and symptom alertness, as well as awareness of necessary and appropriate actions in case of CD outbreaks, at the grass-root level.

202. Indigenous villages were targeted under CDC2 through the model healthy village component, and further project support is being considered for those living in border areas. The Project is not expected to generate adverse impact on ethnic minorities living in the vicinity of the Project areas and is expected to have positive impact on indigenous peoples. The project is category B for indigenous people. In particular, not targeting these people in this project could be a missed opportunity and hence an indirect negative impact, assuming that providing services to these groups is relevant, feasible, and cost-effective. Further socio-economic analysis is required, and an Indigenous People Development Framework and/or Indigenous People Plan will be prepared for the Project. Indigenous people will be informed of proposed project activities and agree to plans how to enhance positive project impact.

203. MOH will need to ensure that the Ethnic Groups Plan (EGP) will be fully implemented including, (a) use of training and outcome targets for ethnic minority groups in project-supported activities, with a particular focus on ethnic minority women; (b) inclusion of specific ethnic minority-related activities in annual operation plans and budgets; (c) recruitment of a social development specialist with a TOR that includes responsibility for integrating ethnic minority development across project activities; (d) inclusion of provisions for addressing ethnic minority issues in all guidelines, terms of reference, strategies and plans developed under the project; and (e) disaggregating all monitoring and evaluation data by ethnicity. To facilitate this process, key features of the EGP will be mirrored in the project DMF and loan assurance. The EGP will be tailored to national/provincial contexts and MOH PMU's capacity for implementation, monitoring and evaluation will be built, including through early hiring of social development specialist consultants responsible for ethnic group issues.

Environmental Risks

204. The major environmental concern of the Project are solid health care waste management (generation, minimization, segregation, collection, transportation, storage, treatment) and liquid waste management (collection and treatment) of hospitals and laboratories. Another concern is the medical waste incinerators, which may not conform with engineering specifications to minimize harmful environmental impact. The Project is initially assessed as an environmental category B project.

Procurement

205. The Cambodia Procurement Law was signed on 14 January 2012. Adequate rules, regulations, and standard operating procedures governing procurement procedures have been made mandatory for over a decade. MOH has built up procurement capacity through the Health Sector Support Program (HSSP) with the World Bank and other partners. ADB's projects are also administered under this Program. The Project Management Unit (PMU) of the current ADB project is proposed to be continued, and has gained procurement experience.

206. However, there are several weaknesses and risks in this relatively young procurement system in MOH. Perhaps the main constraint has been human resources, both in terms of numbers and quality. Staff shortages have been compensated by the engagement of consultants and contractual staff. While the situation has improved somewhat, the market for competent consultants remains very tight and government pay rates are not competitive. The existing ADB project procurement unit needs to be carefully assessment in terms of

performance. Provincial capacity for procurement is less in the targeted provinces compared to the more advanced provinces. Procurement is linked to annual planning cycles so if missed will delay for a year. Procedures tend to be slow, in part to avoid incorrect or fraudulent processes.

207. Procurement will be centralized in view of limited provincial capacity. Based on the assessment, the EA has adequate procurement capacity to handle NCB (National Competitive Bidding) and Shopping, but lacks experience in International Competitive bidding (ICB) for complex health equipment. The PMU will be supported by international procurement and laboratory specialists through the initial stages and by national specialists in the long term. Procurement training will also be provided. Procurement will be monitored to ensure compliance with government and ADB procedures. Procurement processing steps will be carefully monitored and delays will be reported.

Financial Management

208. The financial management assessment was prepared in accordance with ADBs Technical Guidance Note 2015 and incorporates the Financial Management Internal Control and Risk Management Assessment (FMICRA) required by the Guidelines. The assessment also made extensive use of the Integrated Fiduciary Assessment and Public Expenditure Review (IFAPER) for Cambodia in 2011 as well as ADBs Country Partnership Strategy (CPS) for 2014-2018.

209. The latest IFAPER assessment in 2011 using the PEFA framework showed that budget credibility was enhanced after completion of the first stage of the PFMRP in 2008. The result was improved cash management resulting in greater predictability, reliability and availability of financial resources. Despite the significant improvements in cash management, PEFA noted that weaknesses in the PFM remain and a number of issues related to cash flow forecasting have serious implications for ensuring significant resources are on hand to meet the government's cash flow requirement.

210. The report concluded that, (i) The financial management information system (FMIS) should be implemented in key ministries to control spending and prioritize expenditures across programs, projects and policies; (ii) As with many developing member countries, RGC has a shortage of technical skills. Despite on-going capacity building efforts, management skills capacity remains weak and impacts the progress on the PFMR; (iii) The public procurement system is fragmented mainly due to separate legal and regulatory framework for procurement using government funds and external donors; (iv) Internal controls remain weak. The Ministry of Economy and Finance (MEF) has developed templates for audit reports but these are not uniformly used in line ministries and the improvements are largely due to donor reporting requirements rather than those of the government.

211. The ADB Country Partnership Strategy assessed the major governance-related risks to be in public finance management, procurement and corruption. Although gradually improving, the PFM systems remain weak due to low transparency and accountability resulting from (i) the continuation of a centralized budget management with the MEF; (ii) the delay in the transfer of functions and resources to SNAs is also holding back the build-up of capacity in the SNAs thus increasing the risks for management of donor projects that have been assigned to the SNAs; (iii) internal audit and internal controls remain weak leading to less effective and transparent business processes including procurement; (iv) external audit remains weak due to the inadequacy of the NAAs to provide effective oversight of public expenditures. For procurement, the issues identified were the lack of better systems such as e-procurement, lack of an effective complaint and grievance mechanism and lack to staff capacity. The CSP also identified corruption as a high risk in Cambodia. The Anti-Corruption Unit (ACU) has been ineffective in

implementing anti-corruption laws. Furthermore, the related legal and law enforcement institutions (i.e. police, prosecutors and judges) remain weak and vulnerable to poor governance practices due to low pay levels in the public sector that creates a disincentive to good governance practices, patronage and personnel management.

212. Using the Financial Management and Internal Control Risk Assessment (FMICRA) table, the overall inherent and control risks were assessed to also be substantial. The overall combined risk was also assessed to be substantial. A summary of the risks and mitigating measures are presented in the Cambodia Financial Management Report.

Economic Justification

213. The economic benefits of this health security project can be seen by considering the counterfactual, that is, if the project is not implemented and things remain as they are now. The effects examined here are threefold (household, medical services, and society), and result from a sick person not receiving appropriate diagnosis and treatment, which then also allows the disease to spread within the population. In addition, while the risk may be low, the cost of missing an early case of an emerging infection can be enormous. This is hard to capture in economic analysis.

214. Based on the latest data,⁴⁴ about 18% of the population in Cambodia is poor, of which 90% live in rural areas, although poverty in Phnom Penh is reportedly increasing. Poor provinces are mainly in the north-east and around the Tungle Sap lake⁴⁵. Less than half the poor have access to the subsidized health care provided with support of health equity funds. Not only catastrophic health spending but also health spending for chronic illness of children and adults result in income erosion and families slipping into poverty (ADB poverty analysis).

215. While cost of basic health care is not high, this is still a major expenditure for the poor. For both humanitarian and economic reasons, major efforts should be made to step up prevention of diseases, in particular among the most vulnerable populations. MEVs are more likely to be in this group. Arrangements for continuity of care across borders, in particular for treatment of HIV and tuberculosis, need to be considered.

216. The proposed project is considered low-risk for Cambodia based on ADB criteria including (i) extensive experience with ADB projects, (ii) satisfactory rating of CDC1, (iii) satisfactory progress of CDC2, (iv) safeguard categorization B or C, and (v) good cooperation and support of partners in particular WHO. Risks are still in the field of procurement and financial management.

217. Processing a regional project is complex, in particular also with the proposed participation of Myanmar, and Viet Nam processing requirements. This may have implications for the timeliness of project processing in Cambodia, and subsequent implementation in terms of insufficient coordination of control activities and less effectiveness and efficiency of investments.

VII. Conclusions and Recommendations

a. Conclusions

⁴⁴ ADB. *Country Poverty Analysis 2014*. Manila.

⁴⁵ Poor provinces that rank in the top 5 of the Oxford Multi-dimensional Poverty Index are Mondulkiri, Rattanakiri, Preah Vihear, Stung Treng, and Kratie, with poverty ratings of 44-29%. The next batch of poor provinces includes Pursat, Kampong Thom, Kampong Chhang, Kampong Cham, and Siem Reap.

218. South-East Asia is an epicenter of emerging diseases and other diseases and drug resistance of regional relevance with potentially major human and economic impact. Countries in the Greater Mekong Subregion (GMS) are committed to build resilient national health systems and strengthen regional cooperation based on the International Health Regulations (IHR) and Asia Pacific Strategy for Emerging Diseases (APSED).⁴⁶ Regional interventions are required for communicable diseases that rapidly spread across borders or need regional cooperation for their control. For other diseases of regional importance, even the better funded programs for immunization and the control of HIV/AIDS, tuberculosis and malaria do not cover the entire population.

219. To achieve regional health security requires a national health security system, national health system capacity, and regional cooperation mechanism need to be place. While at country level there is already a standardized mechanism led by WHO to achieve the minimum core capacity requirements, this is centered around MOH core capacities, but with less attention for participation with other countries, sectors, and community. In particular, more effort needs to be made in regional cooperation. Regional cooperation can also have benefits in terms of staff motivation, knowledge sharing, and leveraging support.

219. This rather long-term regional capacity building scenario is complicated by disturbing new information on regional diseases. Drug resistance may undermine treatment of HIV, tuberculosis and malaria, not only affecting patient survival, but allowing easier spread of the diseases. More disturbing information comes from the recent Ebola outbreak in West Africa, where patients were found to be infective long after their recovery, and continued to harbor the virus in eyes and testis. This implies that people who had Ebola can potentially cause a new outbreak much later. The implication for a public health system is that the absolute priority is to make all efforts for early identification of any suspected outbreak at community level using syndromic reporting, in addition indicator-based surveillance in health facilities, screening and registration of mobile people, laboratory biosafety, hospital IPC, isolation of suspected cases, and protection of staff and family.

220 ADB is a financing institution with limited staff capacity and works closely with the World Bank on governance and WHO, IOM and other UN agencies on technical matters. ADB brings regional and multisectoral experience, and has been supporting the GMS Economic Development Program and has gained considerable experience with GMS CDC projects. ADB has substantial experience in the Cambodia health sector and ADB health projects in Viet Nam have been relatively low risk and satisfactory in terms of implementation.

221. Given these challenges, opportunities, risks and constraints, the PPTA team conducted sector analysis to identify priorities for improving regional health security and CDC of regional relevance. Based on the initial project scope, proposed project areas are regional cooperation and knowledge management, disease control for MEV, surveillance and response, laboratory services, and rolling out IPC.

222. Some of the major technical challenges are to harmonize information and control strategies in the GMS, increase cross-border cooperation and border control, reach MEVs in border areas and along economic corridors, integrate national surveillance systems, ensure appropriate procurement of equipment based on needs and capacity of districts, and institutionalize structures and support for infection prevention and control in health facilities.

⁴⁶ World Health Organization. *International Health Regulations*. 2005. Geneva. WHO South-East Asia Regional Office (SEARO) and Western Pacific Regional Office (WPRO). *Asia Pacific Strategy for Emerging Diseases (APSED)*. 2010. Manila

223. Major risks were identified in terms of not reaching priority target populations, in particular ethnic minorities and migrants, due to government strategic and operational constraints. Other risks concern procurement and financial management.

b. Recommendations

224. The sector analysis supports the proposed project scope as it responds to major health and economic threats, is based on IHR/APSED, supports government priorities, supports MOH policy and plan, supports reaching out to those not being reached as the main concern of public health security and tie to UHC, reflects integration of CDC under one umbrella of the third health sector program (HSP3) to improve sector efficiency and effectiveness in anticipation of expected changes in aid funding, and proposes mitigating actions for identified implementation risks.

225. It is recommended that the Project has a strong focus on neglected border areas, meaning those border areas where there are no government or NGOs providing services. The government may want to consider using its own provincial mobile teams or contracting NGOs to improve outreach in these areas.

226. In terms of institutional capacity, CDCD is capable in managing the surveillance and response elements including regional cooperation; DHS has a program in place for rolling out IPC but has serious staff constraints; and NPHL is technically competent in improving laboratory services but is also having staff constraints. In addition, DPHIS, to support project administration, has many other responsibilities and also has staff constraints. MOH is encouraged to adopt a participatory project implementation approach and closely work with WHO on technical matters.

227. Given human resource constraints and financial management and procurement risks, a PMU is proposed to facilitate engagement of contractual staff and administrative, technical, and field support. Further consultation with provincial health teams, beneficiaries and other institutions will be needed to detail project design and participation.

a. Preparatory Work Done or to be Done

228. Data collection involved (i) review of surveys and report of MOH and other Ministries, institutions, regional networks, and partners, (ii) field visit to 3 provinces to collect information on the propose scope, and (iii) discussion with government and partners. Provincial assessments used inspection, checklists, semi-structured interviews, and group discussions.

229. The project activities and implementation arrangements need to be planned in more detail, and included in the MOH and provincial annual planning and budget cycle so as not to delay the project upfront. The first annual project plan and budget should be prepared in advance. Preparation of any required legislation or SOPs should also start as early as possible. Provincial health offices will need to initiate a participatory planning process with districts, including mapping of MEVs, to determine specific project activities for MEVs based on local priorities. In particular for procurement of laboratory and hospital equipment, more detailed assessment will be required at the project start.

230. Gender, safeguards and risks assessments are in line with current sector views. Project gender, safeguards, and risk mitigation plans have been prepared, for endorsement by MOH and provincial health offices. Each provincial health office will carry out site specific Initial Environmental Examinations (IEEs) for its health facilities to receive project support according to ADB's environmental policy. MOH will also hold site specific public consultations with potentially affected groups. Each provincial health office will prepare an environmental management plan

(EMP) based on proposed state/region project activities. The EMP will be submitted to MOH, other related government agencies, and ADB for review and concurrence.

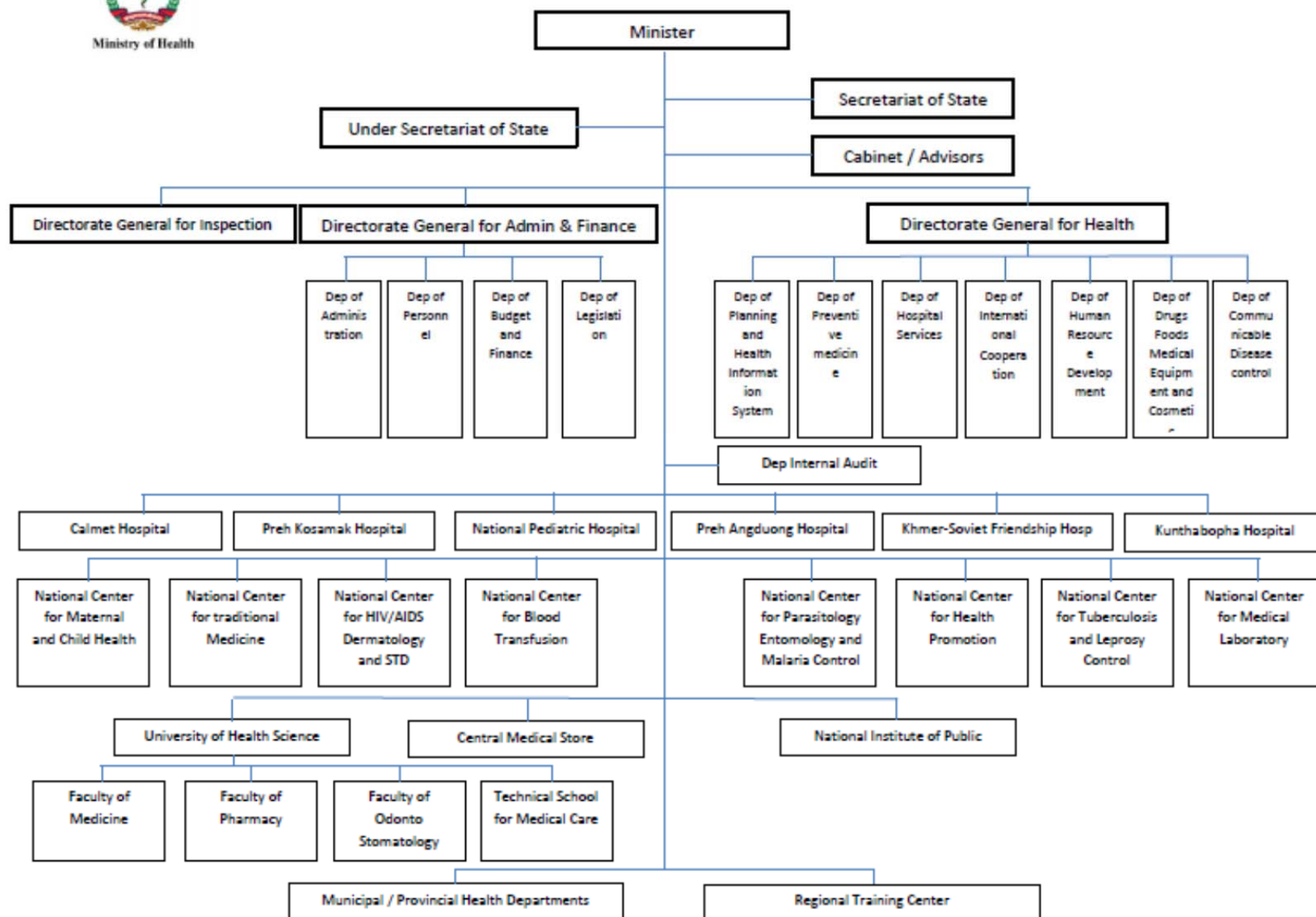
Appendices

1. Organogram
2. APSED Assessment
3. Problem Tree
4. Results-Framework

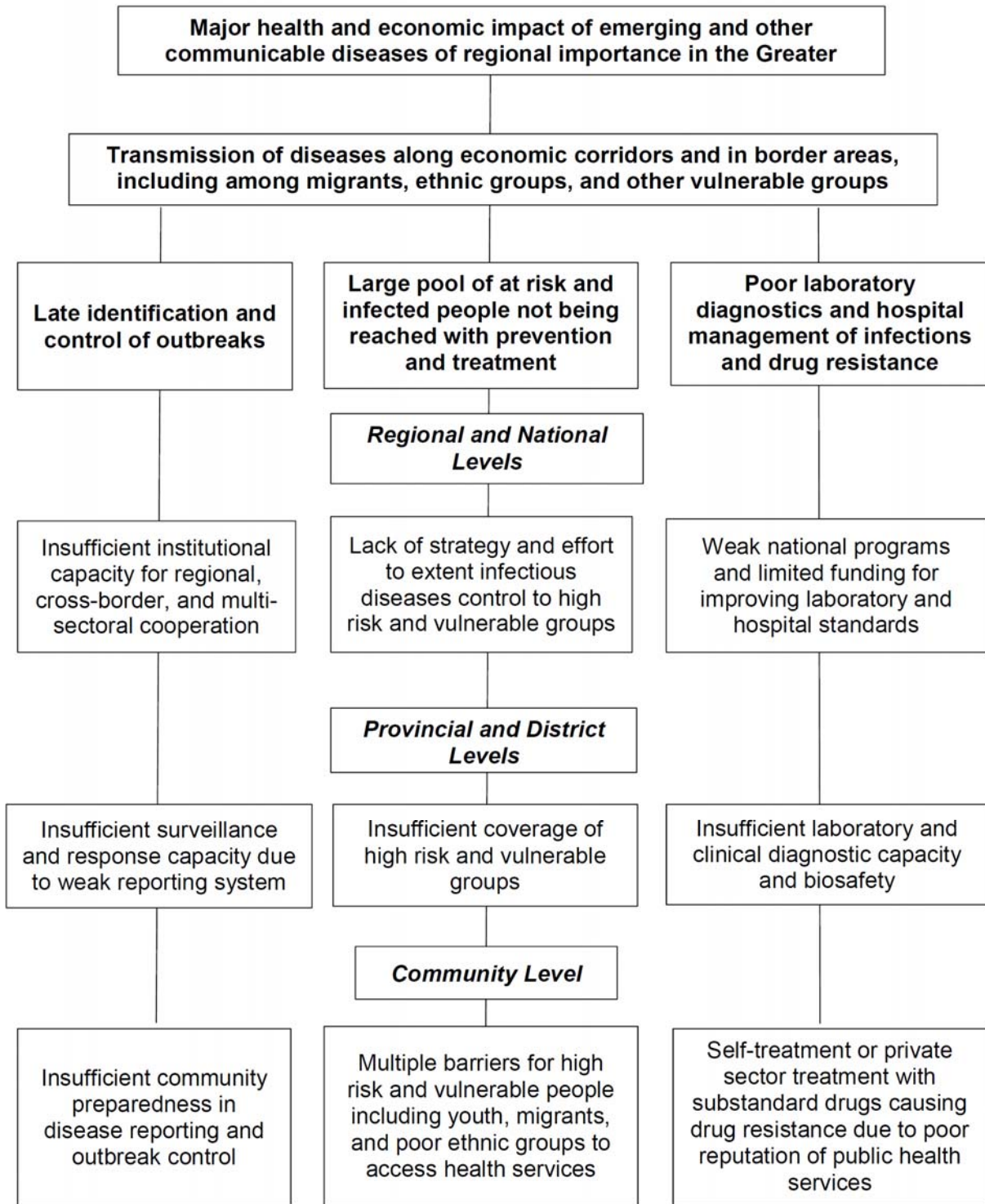
Appendix 1: ORGANOGRAM



MoH, Organizational Chart



Appendix 2: PROBLEM TREE



Appendix 3: RESULTS FRAMEWORK

GMS Health Security Sector Outcomes		GMS Health Security Outputs		ADB GMS Health Sector Operations	
Impact/Outcomes with ADB Contribution	Indicators with Targets & Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Contributions
<p>Impact by 2025: GMS public health security enhanced</p>	<p>Impact indicators Zero major outbreaks of emerging or other epidemic disease in excess of 100 fatalities</p> <p>Outbreaks have less than 0.5% impact on GDP in any quarter of the year</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas receiving treatment for HIV and TB doubled</p>	<p>Enhanced GMS collaboration and CDC in border areas by 2020:</p>	<p>GMS countries report all suspected cases of notifiable communicable within 24 hrs (from zero)</p> <p>Each province conducts cross border and intersectoral disease control activities</p> <p>MEVs reached with CDC programs doubled by 2020</p>	<p>Planned key activity areas: GMS Health Security Project \$125 million: Cambodia \$21.0 million ADF loan; Laos \$8 million grant and \$4 million ADF loan Myanmar \$12.0 million ADF loan Viet Nam \$80.0 million ADF loan</p>	<p>Planned key activity areas: Regional, cross-border and intersectoral collaboration for CDC among all GMS countries; including joint planning to reach MEVs; Outreach program to link MEVs with CDC program Web-based surveillance system including community syndromic reporting, and rapid outbreak response</p>
<p>Outcome by 2020: GMS Health Security System achieved IHR/APSED standards</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas accessed services for communicable diseases control (CDC)</p>	<p>Outcome indicators IHR/APSED compliance increases from 70% to 90% average</p> <p>Coverage of disease control interventions in MEVs increases from 60% to 80% average</p>	<p>Strengthened national surveillance and response system by 2020</p> <p>Improved diagnostic and management capacity of infectious diseases by 2020:</p>	<p>By 2020, all targeted public hospitals conduct web-based reporting of notifiable diseases within 12 hrs and case investigation within 24 hrs compared to 80% in 2014</p> <p>Targeted laboratories meeting national quality and biosafety standards increases from 30% to 60%</p> <p>Targeted hospitals meeting 60% of IPC and case management standards increased from 30% to 80%</p>	<p>ADB Projects in the pipeline with estimated amounts: tbd</p> <p>Ongoing ADB projects with approved amounts: Second GMS CDC Project \$63.5 million Strengthening HIV Prevention Capacity in the GMS Project \$20.3 million Regional Capacity Building TA for Malaria Elimination and CDC capacity building Project \$17.2 million</p>	<p>Laboratories with better biosafety and quality of diagnostic tests</p> <p>Hospital with better infection prevention and control and case management of infectious diseases</p> <p>Planned projects: tbd</p> <p>Ongoing projects: HIV prevention Malaria control</p>

Source: ADB.

CDC = Communicable Diseases Control; GMS = Greater Mekong Subregion; HMT = HIV/AIDS, Malaria and Tuberculosis

LAO People Democratic Republic

Health Sector Analysis

Project Number: 48118-REG
2016

**R-PPTA 8842: THE GREATER MEKONG
SUBREGION HEALTH SECURITY PROJECT**

TABLE OF CONTENTS

Acronyms	2
Summary	4
I. INTRODUCTION	6
<i>a. Purpose of Analysis</i>	6
II. GLOBAL HEALTH THREATS	6
III. PUBLIC HEALTH SECURITY	7
IV. COUNTRY PROFILE	8
V. IHR/APSED CORE CAPACITIES	9
<i>a. Overview</i>	9
<i>b. Organization and Plan</i>	10
<i>c. IHR/APSED Evaluation</i>	11
<i>d. Surveillance and Response</i>	12
<i>e. CDC in Border Areas</i>	12
<i>f. Regional Cooperation</i>	13
VI. LABORATORY SERVICES	14
VII. HOSPITAL INFECTION CONTROL	16
VIII. COMMUNICABLE DISEASES CONTROL	16
<i>a. Malaria Control</i>	16
<i>b. HIV Control</i>	17
<i>c. Tuberculosis Control</i>	18
<i>d. Dengue control</i>	19
<i>e. Childhood Infections Control</i>	20
<i>f. Control of Other Diseases</i>	21
IX. HEALTH SYSTEM CAPACITY	21
<i>a. Health Sector Performance</i>	21
<i>b. District Health Information System</i>	22
X. PROJECT SCOPING	23
<i>a. Key Features</i>	23
<i>b. Role of ADB</i>	24
<i>c. Indicative Project Scope</i>	25
<i>d. Indicative Management Arrangements</i>	26
<i>e. Safeguards and Risks</i>	26
XI. CONCLUSIONS AND RECOMMENDATIONS	27
<i>a. Conclusions</i>	27
<i>b. Recommendations</i>	28
<i>c. Preparatory Work</i>	29

ACRONYMS

ADB	—	Asian Development Bank
AI	—	Avian influenza
AIDS	—	Acquired immunodeficiency syndrome
APEC	—	Asia Pacific Economic Community
APSED	—	Asia Pacific Strategy for Emerging Diseases
ART	—	Anti-retroviral treatment
ASEAN	—	Association of Southeast Asian Nations
BSL	—	Biosafety level
CDC	—	Communicable diseases control
CDC1	—	GMS Regional Communicable Diseases Control Project
CDC2	—	Second GMS Regional Communicable Diseases Control Project
DCDC	—	Department of Communicable Diseases Control
DHC	—	Department of Health Care
DHIS	—	District health information system
DOTS	—	Directly observed treatment – short course
DPIC	—	Department of Planning and International Cooperation
EHF	—	Ebola hemorrhagic fever
EID	—	Emerging infectious diseases
EGDP	—	Ethnic group development plan
EPI	—	Expanded program on immunization
EWARN	—	Early warning and response network
FMA	—	Financial management assessment
FSW	—	Female sex workers
GAVI	—	Global Alliance for Vaccines and Immunization
GF	—	Global Fund to fight HIV/AIDS, tuberculosis and malaria
GMS	—	Greater Mekong Subregion
HEF	—	Health equity fund
HFMD	—	Hand, foot and mouth disease
HIV	—	Human immunodeficiency virus
HSR	—	Health sector reform
IDU	—	Injecting drug user
IHR	—	International health regulations
IPC	—	Infection prevention and control
IPL	—	Institute Pasteur Laos
Laos	—	Lao People's Democratic Republic
LUXDEV	—	Luxemburg development agency
LWU	—	Lao Women's Union
MAF	—	Ministry of Agriculture and Forestry
MBDSP	—	Mekong Basin Disease Surveillance Program
MDA	—	Mass drug administration
MDG	—	Millennium development goal
MDRTB	—	Multidrug resistant tuberculosis
MERS	—	Middle east respiratory syndrome
MEV	—	Migrants and mobile people, ethnic minorities, and other vulnerable groups
MNCH	—	Maternal, neonatal and child health
MOF	—	Ministry of Finance
MOH	—	Ministry of Health
MONRE	—	Ministry of Natural Resources and Environment
MPI	—	Ministry of Planning and Investment
MSM	—	Men having sex with men
NCD	—	Non-communicable diseases
NCLE	—	National Center for Laboratory and Epidemiology
NFP	—	National focal point

NGO	—	Non-Government Organization
NPHL	—	National public health laboratory
NT2	—	Nam Teun 2 Hydropower Project
NTD	—	Neglected tropical diseases
PCR	—	Polymerase chain reaction
PLHIV	—	People living with HIV
PMU	—	Project management unit
PPE	—	Personal protective equipment
PPTA	—	Project preparatory technical assistance
RDF	—	Revolving drug fund
RCU	—	Regional coordination unit
SARS	—	Severe acute respiratory syndrome
SOP	—	Standard operating procedure
STD	—	Sexually transmitted diseases
TB	—	Tuberculosis
UHC	—	Universal health coverage
UNAIDS	—	Joint United Nations Program on HIV/AIDS
UNFPA	—	United Nations Population Fund
UNICEF	—	United Nations Children Fund
USAID	—	United States Agency for International Development
USCDC	—	United States Center for Disease Control
VHV	—	Village health volunteer
VHW	—	Village health worker
WHO	—	World Health Organization
WHR	—	World health report

SUMMARY

The Governments of Cambodia, Laos, Myanmar and Viet Nam are considering support from the Asian Development Bank (ADB) for the Greater Mekong Subregion (GMS) Health Security Project (the project). A health analysis was prepared as part of project preparatory technical assistance (PPTA). This entailed review of sector documents, provincial field visits, collection of information using questionnaires, and discussions of findings and proposed scope with representatives and stakeholders. The report was prepared by the Lao Health Specialist/Co-Team Leader and the PPTA Team.

Emerging infectious diseases (EIDs) like avian influenza, SARS, MERS and Ebola hemorrhagic fever (EHF) and some old world infections like cholera have the potential to spread quickly around the globe, with major economic and sometimes devastating human impact. Other diseases of regional importance like HIV, TB, malaria, and dengue spread less quickly but do not stop at borders and cause major impact at household level. Drug resistance is potentially one of the most threatening emerging problems to deal with common bacterial infections, STDs, HIV, malaria, tuberculosis, and nosocomial infections.

Laos has had rapid economic growth for two decades and achieved major poverty reduction and most of health related MDGs. Connectivity, foreign investment, and industrialization are increasing rapidly, stimulating new economic zones and rapid urbanization. Located in the center of the GMS, Laos has become increasingly vulnerable to the spread of infections due to increasing population mobility and open borders. Major economic corridors transect the country, and tourism is increasing rapidly, in addition to a sharp increase in business travel, mobile people and internal and external migrants. At the same time, there are underserved populations of ethnic minorities, migrants in labor camps, and other vulnerable groups that are more at risk of getting and spreading infections.

To improve public health security, Laos is committed to achieve core capacities based on the International Health Regulations (IHR) 2005, and implement the Asia Pacific Strategy for Emerging Diseases (APSED) 2010, as well as other regional strategies for the control of dengue, malaria, tuberculosis and HIV/AIDS. Despite major political commitments, health system capacity to deal with EIDs and other health threats is inadequate.

The TA team estimated Laos' IHR core capacities at about 66%. Top performing core capacities were coordination, surveillance and food safety. Least performing core capacities, according to the consultants, were for chemical emergencies and human resources. Other areas that scored low were response capacity (mainly because problems with hospital infection prevention and control), legislation, public communication, and services at points-of-entry. In general, MOH is making progress improving its own capacities, but needs to have a more systematic approach to improve linkages with communities, other sectors, private services, cross-border, and regional.

Public health security is as good as its weakest link, and also depends on general health systems coverage and quality. A considerable network of public health facilities has been put in place. However, health service delivery has not kept pace with health infrastructure development. Demand is low due to problems of quality and affordability of services. The sector has been seriously underfunding resulting in high out-of-pocket payment with impact on poverty and health. To achieve universal health coverage (individual health security) by 2030, in line with sustainable development goals, the Government has formulated a health sector reform

program. The Ministry of Health should prioritize health sector reforms that help improve public health security.

The purpose of the project will be to strengthen national health security systems and regional cooperation for the prevention and control of EIDs and other diseases of regional importance in the GMS, and help countries comply with IHR 2005 and APSED. This follows ADB support for various health projects for communicable diseases control (CDC), HIV, malaria, and related regional technical assistance in the GMS under its GMS economic development program.

Specific areas have been identified requiring improvement of IHR/APSED core capacity areas, in particular at district level, including for surveillance and response, laboratory services, and hospital infection prevention and control (IPC). Vulnerable populations including migrants in labor camps and isolated ethnic minorities have to be reached as the surveillance system is as weak as its weakest link. These communities may also have a higher burden of other communicable diseases such as HIV, tuberculosis, malaria and dengue, and efforts should be made to improve village hygiene, case finding, and referral to health services for these communities.

As discussed with the Ministry of Health, for Laos the proposed **project goal** is strengthened GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities; (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year; and (iii) increased use of public health services in border areas by MEVs. The proposed **project outcomes** are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed **project outputs** are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed **project targets** 12 provinces along the borders and economic corridors with Cambodia, China, Myanmar, Thailand and Viet Nam.

The project will be implemented by MOH through the Departments of Planning and International Cooperation, Health Care, and Communicable Diseases Control inclusive of NCLE. A project management unit may be set up to this effect. The total cost is estimated at \$12.6 million, for the period 2017-2022. Various risks and safeguard concerns were reviewed in the areas of reaching migrants, ethnic minorities, and other vulnerable groups, in procurement and training of laboratory equipment, and in financial management. In general, the project is considered to be low risk in view of past MOH experiences with similar projects.

MOH Laos has in principle agreed to accommodate the Regional Coordination Unit (RCU) which serves as the secretariat for the Regional Steering Committee for regional CDC projects.

I. INTRODUCTION

a. Purpose of Analysis

1. Under the Greater Mekong Subregion (GMS) economic development program, the Governments of Cambodia, Laos, Myanmar and Viet Nam are considering support from the Asian Development Bank (ADB) for a GMS Health Security Project (the project). The purpose is to strengthen national health security systems and regional cooperation for the prevention and control of emerging infectious diseases (EIDs) and other diseases of regional importance in the GMS, and help countries comply with the International Health Regulations (IHR) 2005 and implement the Asian Pacific Strategy for Emerging Diseases (APSED) of the World Health Organization.¹ This follows ADB support for various health projects for communicable diseases control (CDC), HIV, malaria, and related regional technical assistance in the GMS under its GMS economic development program.²

2. As part of the project preparatory technical assistance (PPTA), the Laos public health consultant and co-team leader undertook a health sector analysis for the proposed GMS Health Security Project for Laos. The purpose was to examine the relevance of the proposed scope, and identify project priorities and risks in Laos. This report includes (i) a general sector review to identify health system priorities and constraints; (ii) a specific review of public health security progress and gaps; and (iii) review of proposed project scope, risks and implementation and monitoring arrangements.

II. GLOBAL HEALTH THREATS

3. After the SARS outbreak in 2003 and avian influenza (AI) outbreak in 2004, several other outbreaks of EIDs occurred in the GMS. Globally, several dangerous strains of influenza A circulate in the region including H7N9, H5N6, H5N1, and H1N1. Over 1,200 cases and 400 deaths due to MERS-CoV have been reported in 20 countries, including most recently in Korea. More than 14,000 Ebola deaths have been reported among 28,000 cases in the West Africa outbreak. WHO has announced a state of emergency on the Ebola virus worldwide. EIDs and some old world infections like cholera have the potential to spread quickly around the globe, with major economic and sometimes devastating human impact. Other diseases of regional importance like HIV, TB, malaria, and dengue spread less quickly but do not stop at borders and cause major impact at household level. Drug resistance is potentially one of the most threatening emerging problems to deal with common bacterial infections, STDs, HIV, malaria, tuberculosis, and nosocomial infections.

4. Laos is highly vulnerable to the spread of infections due to long and open borders, connectivity, and traffic. Major economic corridors transect the country, and tourism is increasing rapidly, in addition to a sharp increase in business travel, mobile people and migrants. At the same time, there are underserved populations of ethnic minorities, migrants in labor camps, and other vulnerable groups that are not in touch with public health services but at risk of getting and spreading infections. Laos has a surveillance and response system in place headed by the National Laboratory of Public Health and supported by the Institute Pasteur Laos,

¹ World Health Organization. International Health Regulations.2005; Asia Pacific Strategy for Emerging Diseases. 2010.

² Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

and past EIDs were identified and controlled at an early stage. However, a large number of unconfirmed cases and events suggests there are gaps in the surveillance and response system. Laos has to become more resilient to the threat of EIDs and other diseases of global importance.

III. PUBLIC HEALTH SECURITY

5. The term Public Health Security, or sometimes called Public Health Resilience became popular after formulation of IHR 2005, in view of the threat of EIDs. WHO, in the WHR 2007, coined it as *a set of activities, proactive and retroactive, to minimize vulnerability to acute public health events that endanger the collective health of populations*. Public health security is a public health goal, and health security systems are outcomes. Public Health Security is complementary to Individual Health Security, or Universal Health Care (affordable quality health care for all), by 2030, and are closely intertwined economically and socially.³

6. Health security includes (i) measures to avoid emergence of diseases (biosafety, immunity, safer drugs), and (ii) measures to interrupt disease transmission (hygiene, vaccination, isolation, treatment). While the usual focus is on interrupting transmission, in view of declining public exposure to pathogens and increasing drug resistance, more attention should be given to avoiding the emergence of new diseases, e.g., by controlling the sale of antibiotics and improving nutrition status.

7. Health security depends on strong government commitment, given the public goods nature, and depends on all chains in a health security system, as reflected in APSED, to be in place. Second, health security depends on core capacity of a basic health system (sometimes this is not given attention in APSED assessments). Within the health sector, this includes leadership, communication, adequate financing, logistics, and private sector participation; and, outside the health sector, local government capacity. Third, health security depends on community participation in prevention and reporting suspected cases. For example, the EHF outbreak in West Africa was largely controlled through community action including social distancing, assistance in contact tracing, and sanitary measures. Communities not connected to health services, often located in border areas and with a higher burden of communicable diseases, are of major concern. Fourth, health security also depends on security in neighboring countries, and in regional and cross-border cooperation. In five years, all GMS countries, as part of ASEAN, should develop adequate surveillance and response systems, and in 15 years all countries should achieve adequate IPC based on WHO standards.

8. Accordingly, the scope of a Health Security project is not simply filling IHR/APSED gaps, although this is a major part. It also concerns improving access of high risk groups to the health system to support control of EIDs, and strengthening relevant parts of the health system. While these strategic areas may be addressed through other sector developments, specific gaps that affect health security need to be identified and addressed. Regular APSED monitoring therefore should incorporate health system assessment relevant to health security and be linked to sector-wide remedial actions. Lastly, governments, regional networks and partners need to come together in an integrated program approach, as this may otherwise lead to fragmentation

³ The term “health resilience” was used in the opening speech of the May 2015 WHO Health Assembly. Public health security may be understood in a narrow sense as the capacity to avoid and contain epidemics. In the wider context, health security may also concern man-made chemical and radiological threats, natural disasters and perhaps also epidemics like obesity and road traffic accidents.

and duplication, and increase the likelihood of outbreaks. Program coordination in rolling out IHR/APSED also needs to be monitored.

9. Government intervention in health security and CDC is justified on the basis of public goods and externalities, market failure, and equity issues with high benefit cost ratios. EIDs, the spread of other infections of regional relevance, and drug resistance also constitute national and global security concerns in terms of potential for major human disaster and economic meltdown, requiring government intervention. However, that does not imply that the government should provide these services, but should consider other ways, including regulation and contracting out, given government's operational constraints, and encourage private sector participation. While there is increasing pressure to shift government funds to NCDs, the age-specific burden of diseases shows communicable diseases kill far more children than NCDs, in particular for the poor.

10. The term public health security is more narrowly used for taking measures to reduce the threat of EIDs such as Avian Influenza, SARS, MERS and Ebola hemorrhagic fever (EHF), and also to potential spread of other infections in the region, such as cholera and dengue. The spread of diseases through drug resistance, including HIV, bacterial infections, malaria and tuberculosis constitutes a real regional and global threat, and should be given high priority.

11. Laos is committed to fulfill its obligation to build up core capacity in the fight against EIDs and other public health events under the International Health Regulation (IHR 2005).⁴ Laos participates in the implementation of the WHO-led APSED. The country is close to compliance with IHR requirements, which are due by 2016. Hence, the government is committed and pressed to take the final steps in bringing the country up to international standards for public health security.

IV. COUNTRY PROFILE

12. The Laos is a land-locked and resource-rich country strategically located in the center of the GMS. It has 6.8 million people increasing at 1.8% in 2014.. The economy is driven by natural resources. Since 2004, it has seen rapid economic growth at around 7-8% per annum, and reached a per capita income of \$1,661 in 2013.⁵ About 70% of the work force are engaged in agriculture, for 26% of GDP. Private investment and the financial sector are scaling up. Tax collection is low and public debt is high, constraining services and development. Most wealth is concentrated in urban areas, with a growth rate of 5% per year. Poverty levels have reportedly halved to 23.2% in 2012-13 since 1992-2003.⁶ Poverty is predominately rural, with high concentrations among ethnic minorities in poorly accessible mountains bordering China and Viet Nam. The 2014 human development index places Laos as 139 out of 187 countries.⁷

⁴ WHO International Health Regulations 2005 Second Edition. The IHR (2005) is a legally binding document for all member states of the WHO. The purpose and scope of IHR are to *“prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade”*. Cambodia has also actively participated in different activities at national, regional and global levels leading to the adoption of the IHR (2005).

⁵ World Bank indicators.

⁶ Lao Statistics Bureau and World Bank. *Poverty in Lao PDR: Poverty Report for the Lao Consumption and Expenditure Survey (LECSV) 2012-2013*. 2014.

⁷ United Nations Development Programme. Human Development Report. 2014.

13. Laos's health statistics have improved dramatically and most health MDG indicators have been achieved, but are still lagging, among others because of remote communities and poor migrants in border areas. Between 1990 and 2008, the maternal mortality ratio decreased from 1,200 to 580 per 100,000 live births, but is not yet on track to reach the government's MDG target of 300 per 100,000 live births by 2015.⁸ The total and adolescent fertility rates remain high in rural areas. Between 1990 and 2013, the infant mortality rate has fallen from 111 to 54 per 1,000 live births compared to a target of 45 per 1,000 live births in 2015. Only about 60% of children age 12-23 months is fully immunized, among the lowest in the world. Malnutrition and parasitic infections have reduced substantially. At least one third of women have micronutrient deficiencies, and about one quarter of children aged 0-5 years are underweight.

14. The country is facing a triple burden of diseases – more of communicable diseases and maternal and child health and nutrition problems in rural areas; and in urban areas more non-communicable diseases (NCDs); and a very high rate of road accidents and injuries. With increased life expectancy and life style changes, a larger burden of NCDs will increase demand for high-end services. The Laos has adopted a national health sector strategy and program approach to reform and harmonize the sector, and is aiming for Universal Health Coverage by 2030.

15. The public health system has been chronically under resourced, with major problems of access, quality and affordability of health services. Improvements in sector financing and human resources are slow to take place. Dramatic improvements in health MDGs are in part explained by developments outside the health sector, including better connectivity, income, education, and water and sanitation. However, as basic living conditions for health are in place, further advance in health indicators will increasingly depend on public health services for both UHC and public health security.

V. IHR/APSED CORE CAPACITIES

a. Overview

16. The Laos is highly vulnerable to the spread of EIDs and located in the epicenter of several EIDs. It has increased connectivity along economic corridors, has long borders, has poor community access, and has limited response capacity. The country received 3.8 million tourists in 2013, ten times more than in 1995, in addition to a sharp increase in business travel, mobile people and migrants. EIDs like SARS and MERS have the potential to spread quickly around the globe, with relatively large economic, and sometimes devastating human impact.

17. The country also continues to battle numerous other infectious diseases including HIV/AIDS, tuberculosis, malaria, dengue, childhood infections, neglected tropical diseases (NTDs), food- and water-borne diseases, and zoonosis. While these communicable diseases have reduced, they require major efforts to keep them under control as risk factors are present. These diseases are, to varying degrees, diseases of regional significance, and are linked to multiple risk factors including connectivity, occupation, and poor living conditions. These diseases carry the potential of causing new epidemics due to changing pathogens, risk factors, and drug resistance. Drug resistance for common bacterial infections, STDs, HIV, malaria, tuberculosis, and nosocomial infections is a major global health concern. Hence, part of the reform agenda in Laos's health sector is to make the country more resilient and secure to the threat of EIDs and other diseases of global importance, including drug resistance.

⁸ Estimate WB, UNICEF, UNFPA, UNDP, WHO (WB indicators).

18. The overarching policy drivers for Laos public health security are the IHR and the APSED. These were distilled into a National Work Plan for Emerging Infectious Diseases, 2007-2010 but it is unclear whether there is a more recent version of this document. A range of disease and services specific policies and plans are in place to guide program implementation, such as for HIV/AIDS, tuberculosis, malaria, dengue, NTDs, and laboratory services. A common weakness is the lack of a financing plan for CDC.

19. Given the incubation period of EIDs, the most likely place patients with EIDs are identified are in hospitals, as patients who get sick will seek hospital admission. Hence, hospitals are likely to be the most likely place to identify cases. Hospitals in Laos, after years of underfunding, are not in a good state to handle highly infectious cases, and are likely to become a source of the spread of an EID, as was the case with MERS in South Korea. Also given that the surge capacity for any outbreak is close to zero, as it is even in developed countries, prevention, early reporting, and timely and appropriate response are essential to avoid major epidemics.

20. Health security is not achieved in isolation. It is highly dependent on strong government commitment, given the public nature of prevention and control. It requires intersectoral and intercountry collaboration. Health security depends on its weakest element, so government needs to ensure that all parts of a health security system are in place. Health security depends on the capacity of the basic health system, both within the health sector, e.g. qualified staff, health management information system, procurement system, logistics, financial management, private sector participation, interministerial coordination, and outside the health sector, e.g., local government. Importantly, health security depends on community participation, not only in reporting suspected cases, but, as evident in the EHF outbreak in West Africa, through community action including social distancing, contact tracing, and sanitary measures to bring the disease under control. Communities not connected to health services, often with higher concentration of communicable diseases, are of major concern. Lastly, health security also depends on security in neighboring countries, and in regional and cross-border cooperation. China and Thailand already have strong surveillance and response systems in place, and it is imperative that the other GMS countries can achieve the same in the next 15 years.

b. Organization and Plan

21. The Department of Communicable Diseases Control (DCDC) including NCLE is responsible for day to day IHR/APSED capacity building and surveillance and response. Several IHR/APSED core capacities are shared with other ministries. Zoonoses are handled by the Ministry of Agriculture and Forestry (MAF). Disaster risk management is led by the Ministry of Natural Resource & Environment (MoNRE). Chemical and nuclear accidents are led by the Ministry of Agriculture and Forestry (MAF).

22. MOH has established an IHR National Focal Point (NFP) in NCLE, and focal points at provincial and district levels. Quarantine officers are also available at major international airports, ports and land crossings. This unit also manages disease prevention and emergency health services following disasters. MOH has an emergency operations room in DCDC to manage any major public health event, including managing the reporting and investigation of notifiable and other epidemic prone communicable diseases, risk analysis, community preparedness, and outbreak control.

23. An interministerial committee on SARS and EIDs was established in 2012, and a National Strategic Plan for Disaster Risk Management was prepared by MoNRE and approved

in 2014. For avian influenza, a Technical Working Group on Zoonosis is in place and functioning with representation from MOH, MAF, MoNRE, and local governments.

24. During epidemics and other major public health events, a broad multi-sectoral support is essential including maintaining law and order, setting up treatment centers, logistics, management of essential services such as water and electricity, community tracing of infected cases, hygienic burials, public information for social distancing and other measures, and international relief coordination. The EHF outbreak in West Africa demonstrates the complexity of epidemic response.

c. IHR/APSED Evaluation

25. In 2012 and 2014, MOH requested for 2-year extension to meet IHR core capacities. A PPTA review of the 13 IHR core capacities (241 fields) arrived at a total score of 66% on average, which is quite low for the GMS. However, it should be kept in mind that this is an assessment by the consultants based on incomplete information. Each core capacity is also an average. For example, the total scope for response capacity is quite low at 67%, as this score includes IPC in hospitals, which is yet to be rolled out, in addition to emergency response capacity, which is quite good.

26. Top performing core capacities were coordination, surveillance and food safety. Least performing core capacities, according to the consultants, were chemical emergencies and human resources. Other areas that scored low were response capacity (in particular IPC), legislation, communication, and points of entry. Because questionnaires keep changing, it is difficult to observe trends. The message is quite clear, in that MOH needs to address the various outstanding issues of IHR, starting with ensuring sufficient legislation and SOPs for all IHR aspects and human resources development. Given many other competing needs for legislation in MOH, this is a major challenge and would justify financing WHO to provide additional technical assistance.

Table 1: IHR Core Capacities PPTA Appraisal

No.	Core capacity	2016		
		fields	accomplished	%
1	Legislation	5	3	60
2	Coordination	18	16	89
3	Surveillance	26	21	81
4	Response	40	23	58
5	Preparedness	14	10	71
6	Communication	8	5	62
7	Resources	9	4	44
8	Laboratory	23	18	78

No.	Core capacity	2016		
9	Points of entry	33	20	61
10	Zoonosis	13	9	69
11	Food safety	20	16	80
12	Chemicals	17	7	41
13	Radiological	15	7	47
	Total score	241	159	66

d. Surveillance and Response

27. NCLE is managing the surveillance system, EWARN, which is currently limited to syndromic reporting of 17 notifiable diseases. The completeness and accuracy of information need further improvement. According to NCLE, some surveillance systems have been integrated, while program specific surveillance systems such as for EPI are continuing. The plan is to link all to the general health management information system, DHIS (based on Oslo software), which is also being rolled out. EWARN is reported from all levels, through multiple channels, among others to identify suspicious cases or outbreaks to be further investigated. Computerization is done from district level upwards and even at district level there are power and connectivity problems. Villages and health centers usually report by hand or text messages. While there are plans to connect 200 health centers with internet, this is mainly in the more accessible south. The main shortcomings at present are IT and data entry staff, training, and computers, items which the project may support. There may also be a need to train more staff in field epidemiology.

28. Vehicles for outbreak response are in place but in some provinces are getting old (8 years plus). Also PPE is mostly available, as well as funds for outbreak investigation, about \$2500 per province, but this is still being financed by ADB, and should be taken over by the Government. Investigation funds cannot be used for other activities. The Government and WHO also provide funds for outbreaks but usually based on repayment of expenditures, which is not a satisfactory arrangement for emergencies.

29. Other areas of APSED related to surveillance and response are risk assessment, risk communication, one health, regional and cross-border cooperation and community preparedness. WHO supports APSED monitoring. These areas only require very modest support, but all need strengthening. In particular regional cooperation is marginalized and activities have reduced in part due to financing constraints, and discontinuation of the financing mechanism of RCU. This needs to be urgently addressed as this is an important feature of CDC2.

e. CDC in Border Areas

30. Border areas in Laos are a major challenge for public health security. They are mountainous, have ethnic groups that speak other languages, have large numbers of mobile people and migrant workers, have less penetration of services, and may have security problems. Within the GMS, the border areas are probably a major risk area for epidemics going

unnoticed for some time. Hence, in addition to improving general surveillance and response and ports of entry, a strong case can be made for targeted border areas. Currently, event-based reporting from village level is very low, and indicator-based reporting will require cooperation of nongovernmental services. However, given the current information gap, this is probably a high priority. This can only be done with support of local communities, community representatives, and various formal authorities. Public health security in border areas requires collaboration with various ministries and a range of other stakeholders and justifies a special program, which may also attract international aid.

31. A second reason for targeting border areas is a relatively high burden of communicable diseases including HIV, tuberculosis and malaria due to often unhygienic conditions in villages and trade centers, and large number of migrants working in plantations, industries and services. While the burden of HIV is higher in cities where there is access to medicine, getting HIV infected probable occurs in settings with drugs and multiple partners, conditions typically observed in ethnic villages and industrial zones in border areas.

32. Posting field epidemiologists at provincial level and assistant field epidemiologists at district level will build up much needed capacity for CDC in border areas. This needs to be accompanied with outreach and increased capacity of laboratories to diagnose and hospitals to provide treatment. A longer term approach focusing on disease prevention is the model healthy village development which has been used successfully in Laos.

f. Regional Cooperation

33. Laos, at the center of the GMS, has played a leading role in regional cooperation and control of EIDs including SARS and AI, and in piloting control of major communicable diseases such as for HIV/AIDS, malaria and dengue.

34. Regional and cross-border cooperation have been important features in GMS projects as these helped to build linkages between ministries, provinces and experts; increased the sharing of knowledge, and in general stimulated improved performance. The regional steering committee, project review workshops, and technical forums all proved very useful indeed. Setting up community of practice (COP) and other knowledge management systems was however hard to sustain as this requires champions who can devote time running these knowledge management activities. Regional and cross-border cooperation was also challenging due to (i) political sensitivities; (ii) lower staff priority; (iii) flow of funds problem; and (iv) complexities of dealing with different systems. ADB's GMS CDC1 and CDC2 projects were able to provide bridge funding through a regional pool mechanism managed by the regional coordination unit (RCU), but this has been discontinued. Alternative mechanisms for supporting and institutionalizing regional and cross-border cooperation need to be identified, e.g. with technical assistance bridge financing.

35. Regional cooperation has different rationales that need to be analyzed in terms of their merit and burden. Infections easily spread across borders, so exchange of information on suspected cases of notifiable diseases and timely outbreaks control of diseases is important. Some progress has been made in this regard, but progress has been slow due to the need to develop standard operating procedures for information exchange. MOH has made less effort than desired possibly due to sensitivities and other priorities. Other mechanisms for information exchange, such as through WHO and MBDS tend to be too slow to be meaningful for control. In many cases, provinces went ahead arranging local cross-border cooperation, often with the support of local governor.

36. Other reasons for regional cooperation are learning from each other, challenging each other to do better, joint leverage to get support, and economy of scale in working together. Among these, the first two have been important in the GMS CDC context, with numerous exchanges and workshops being held on a wide range of topics, providing exposure to program managers and challenging them to do better. Some of the knowledge management activities have been less effective, such as setting up community of practice. Importantly, future knowledge management activities should be geared towards GMS/ASEAN/APEC standards and development of evidence based strategies.

37. A regional cooperation unit based in MOH, Vientiane, currently provides support to the extended CDC2 project and is likely to continue for the proposed project with the support of ADB.

VI. LABORATORY SERVICES

38. NCLE is also managing national laboratory services. These basically consist of the national public health laboratory (BSL2), Pasteur (BSL2+), Merrieux, regional laboratories, other provincial laboratories, and district laboratories. There are also plans for laboratories at health centers. The national lab does routine virology (PCR) but not culture, and testing is limited due to lack of reagents. Pasteur can test for few EID including Ebola virus. The current NCLE cannot be upgraded to a level 2+ or 3 as this would require a specially designed building. Maintenance cost of a BSL3 building would be some \$50,000 per year, so experts advise against it. The national animal health laboratory has a new level 2+ facility including culture of viruses, and could be approached for testing on H5N1 for example.

39. Bacteriology is available in provincial hospitals, including fixe regional hospitals supported by EU and 12 provincial hospitals supported by ADB.⁹ Virology is not done except Elisa may be used for example for dengue. A sample transport system is in place. This arrangement is considered satisfactory as there are few cases which may need to be tested at provincial level. Priority is still to improve regional laboratories in terms of range of tests and quality control. District laboratories have very limited facilities, staff and functions, with a serious shortage of lab assistants, reagents, and microscopes. The lab assistant training in Savannakhet has not started. Each district laboratory is expected to have two laboratory technologists, and larger hospitals at Bachelor level. One issue in staff training is frequent movement of staff.

40. A laboratory assessment was done in 2009/2010 and a national laboratory plan has been prepared (2015-2020). As for EID, there appears to be less that can be done unless one considered major civil works for NCLE. There is clearly a need to standardize test, equipment and management of laboratories as part of a quality assurance program for routine laboratory services including for HMT (see USAID training program). Even though WHO and ADB provide support, there are also chronic shortages of reagents and other supplies that need to be addressed.

41. Laos MOH has a National Policy for Health Laboratories and National Strategic Plan for Health Laboratories as well as a Health Technology Policy. Health technologies are regulated by the Medical Products Supply Centre but the allocation of the technologies is the responsibility

⁹ ADB. Second GMS Regional Communicable Diseases Control Project. 2009. Manila

of the Department of Health Care. It is not clear how far into the laboratory diagnostics area this administrative oversight has extended.

42. Strategic Priority 3 of the WHO Country Co-operation Strategic Agenda 2012-2015 is: Prevent and control infectious diseases and public health events. These include emerging and re-emerging diseases and food-safety. This complements the objectives of the proposed GMS Health Security project. WHO has translated the WHO Biosafety Guidelines into Lao and the document is now available for distribution.

43. In the course of the ADB CDC2 project, staff from the MOH, the National Centre for Laboratory and Epidemiology (NCLE) and WHO convened a number of meetings to develop a template for the development of Standard Operating Procedures (SOPs) for use in laboratories throughout Laos. This process should be reviewed, rejuvenated if necessary and extended.

44. NCLE, with donor support, is developing a range of Quality Processes. The project should support this process if funding from other donors ceases. In addition, five regional laboratories (Champassak, Savannakhet, Khamnounge, Luang Prabang and Oudomxay) have adopted the WHO Laboratory Quality Management System and the Stepwise Laboratory Improvement Process. This process should be supported and the impact in these laboratories evaluated. These processes, modified as necessary, should be rolled out to project provincial laboratories.

45. USCDC has supported the training of teams at Champassak, Savannakhet, Khamnounge, Vientiane, Luang Prabang and Oudomxay to collect samples for the national influenza-like illness (ILI) and severe acute respiratory infection (SARI) surveillance system. ADB support should attempt to dovetail with this system of specimen referral wherever possible. In particular, the efficiency claimed for the reporting process should be investigated.

46. The undergraduate training of medical laboratory staff is chronically under-resourced and the training facilities make it almost impossible to teach students Good Laboratory Practice. Furthermore, the curriculum does not appear to focus on developing competencies to diagnose the priority diseases in the Laos. In-service training in the workplace does not appear to be systematic and there is no follow-up to determine the success, or otherwise, of the training. There would be value in providing key small items of equipment and consumable items to support the undergraduate training of medical laboratory scientists in topics related to this project

47. Many doctors at the provincial and district levels have never heard of diseases like leptospirosis, brucellosis, many of the neglected tropical diseases or many of the agents responsible for diarrheal diseases (i.e. food borne diseases). They also lack the training to interpret the results of serological tests. There is an almost impenetrable divide between many doctors and laboratory staff that hampers appropriate laboratory testing and reliable interpretation of data. Training workshops should focus on joint, in-service, training of doctors and laboratory staff.

48. Laos is struggling to reach functional levels of herd immunity against many vaccine preventable diseases. This project should include laboratory surveillance for vaccine preventable diseases. There should be a detailed audit of all CDC2 project laboratories to identify areas not addressed adequately in CDC2 and these should be addressed as part of the CDC3 procurement and training plans.

49. The diagnostic tests supplied to provincial laboratories under CDC2 have not been used as intended. The results of the tests have not been provided to the Epidemiology Department at NCLE. Although the tests were provided free of charge by the project, provincial laboratories are charging patients for the tests. This defeats the role of these tests in providing laboratory-based disease surveillance.

50. The Epidemiology Department at NCLE is keen to play a role in harmonizing case definitions and disease surveillance among the four countries participating in CDC3. They also would be interested in evaluating a syndromic surveillance system, similar to the Pacific Public Health Surveillance Network, at the village/commune level in Laos.

VII. HOSPITAL INFECTION CONTROL

51. The Department of Health Care (DHC) is responsible for hospitals and related clinical services and is in the process of rolling out IPC with support of WHO. Infection control in hospital is important as hospitals often have the first cases of an EID, and spread from hospitals, as was the case in MERS. Even no developed country has large surge capacity for EID. The Laos, has about 30 beds nationwide, 15 in Vientiane (10 in Friendship hospital), others in larger provincial hospitals, that can be commandeered for quarantine. Some of these were upgraded with earlier ADB support for SARS, but all do not have specialized equipment and safety features. The main purpose is to isolate suspected cases for further investigation. MOH would also like to construct a special facility in Vientiane for management of (suspected) cases of EIDs. Transport of suspected case has also been prepared and simulation exercises are conducted yearly.

52. MOH is implementing IPCI (WHO), formally called hospital hygiene, in a phased manner based on APSED/IHR, to control general infections, EIDs, and nosocomial infections. A strategy has been prepared in 2013 to roll out IPC. Standards and guidelines have been prepared. The initial target was national and provincial hospitals. The next phase is to improve IPC in district hospitals. Each hospital has a designated staff for infection control, but only 25 persons have been provided training for four months, and there are only six BA and one MS in infection control, all in Vientiane. Post-graduate or BA training in infection control at the UHS is being considered. Some 300 persons have also been provided short training in infection control, including case management of EID. This training does not extend to case management of other infections, which is yet to be discussed.

53. While there is some protective gear, there are shortages of supplies and equipment. Other problems include lack of water and sanitation maintenance, waste disposal, and lack of autoclaves and incinerators. Logistics of supplies also needs to be improved, e.g. through a central supply system. Laboratory bacteriology needs to be improved to test for nosocomial infections. Jointly with WHO, an infection control monitoring system is being designed. Accreditation of health facilities will also be subject to meeting infection control standards. IPC needs to be invested in collaboration with WHO. Related areas such as laboratory biosafety and infection control in public places also deserves attention.

VIII. COMMUNICABLE DISEASES CONTROL

a. Malaria Control

54. Malaria prevalence in the Laos is low, with only few cases each year in the northern provinces, and in the southern provinces a small number of cases and shifting outbreaks. MOH,

WHO and Global Fund experts are preparing a plan for elimination of malaria in northern Laos, and intensive control in southern Laos. Malaria is scattered and malaria control cannot be targeted to few provinces. General malaria surveillance will be done by including few indicators in DHIS. The malaria program will maintain a separate program monitoring system using multiple indicators to monitor program effectiveness and efficiency, as also required by GF.

55. Outbreaks are typically linked to illegal logging in primary forests by non-immune migrants in search of hardwood. According to a Health Poverty Action study, 77% of these forest workers use public health facilities, and two thirds are Lao. As the loggers often work at night and are bitten outdoors, bed nets may not work and alternative control methods are required. Mobile teams may be one option.

56. The 2-year GF grant Lao-708-G09-M of \$6.4 million started in mid-2013 and was extended to December 2015. The next 2-year malaria grant of \$8.0 million covers 2016 and 2017. The grant will finance malaria control in the southern provinces where most malaria occurs. This is mainly for bed nets, case detection, treatment, and general support in hotspots. An estimated 350,000 malaria tests, Artemisinin-based Combination Therapy (ACT) for 50,000 malaria cases, and artemisinin resistant treatment for 500 severe cases will be provided. It aims for 85% long-lasting impregnated bednet (LLIN) coverage of the at risk population which, supplied by GF, cost \$2.30 each. However, distribution of LLIN could be better targeted, if funds for proactive distribution were available. Social marketing of LLIN is not encouraged nor offered by suppliers. The GF will not support malaria surveillance in the northern provinces, mobile clinics, *Plasmodium Vivax infection control*, the supply chain, and participation of private clinics. While less lethal than *Falciparum* infections, *Vivax* infections can hide in the liver for years and need special treatment.

b. HIV Control

57. The Laos is surrounded by countries with higher HIV prevalence. Being a small population with increasing exchange, the epidemic is expected to grow. HIV/AIDS remains low in the general population at 0.3% (based on about 50% of women attending antenatal clinics). However, it has not declined in 6-7 years, with about 800 new cases per year. HIV prevalence is concentrated in 17% in IDUs, among the highest in the region, female sex workers (FSWs), and Men having Sex with Men (MSM). Out of school youth is also at increased risk due to earlier and unprotected sexual activity. A major HIV burden is linked to migrant labor in Thailand. Among the half million Lao migrants, half of them illegal, HIV prevalence is 0.7% (compared to 2% in Myanmar migrants). It is particularly increasing in migrant from ethnic groups like Hmong and Kmu. In addition, HIV patients from Thailand seek treatment in Laos and vice versa, due to concern of anonymity. Provinces with higher HIV prevalence are Bokeo, Luang Namtha, Vientiane, Vientiane Province, Savannakhet, Champasack, Khammuane and Luang Prabang.

58. The GF will limit its outreach (prevention, STI, testing) to FSWs and MSM and transgender in six high burden provinces, including issuing two million free condoms to 5,000 MSMs and 10,000 FSWs per year. The six provinces are Luang Prabang, Vientiane Capital, Vientiane Province, Kammouane, Savannakhet, and Champasak. This means that the northern provinces are largely left out, including for testing in these high risk groups. In particular the golden triangle is becoming an HIV problem with tourists staying overnight and being served by underage sex workers, which is also a child rights issue.

59. Harm reduction is not supported by GF. It was noted that Methadon substitution is not approved, but needle exchange is allowed. Challenges are reaching at risk population, and

increasing testing of IDUs, prisoners and other risk groups. GF support for blood safety is phasing out. The current ADB project is targeting the Laos Viet Nam border, including Huaphan and Phongaly, which have an IDU problem linked to switching from opium to heroin use.

60. For the next two years, GF will continue to support HIV testing in all districts (172 centers), treatment in 10 treatment sites for an estimated 3,000 PLHIV on ART including 200 children. For Prevention of Mother to Child Transmission, about 33,000 pregnant women attending ANC will be tested annually and provided ARV (but ANC coverage is only 50%). About 50% of AIDS patients receive treatment typically late, implying that HIV carriers continue being infective in the population. The country has five CD4 machines in Vientiane, Luang Prabang, Savannakhet and Champasack. Ideally, treatment should be based on viral load, but this equipment is not available (Thailand provides assistance).

61. GF expects increasing government contribution in the next two years. However, due to low prevalence, HIV is not considered a government priority, and UNAIDS has scaled down its representation. UNICEF has stopped its support for orphanages and students, and UNFPA is not involved. USAID provides \$350,000/year support for MSM in three provinces. The two-year GF Lao-H-GFMOH of \$14,192.373 supporting HIV/AIDS control ended in Dec 2015. The next 2-year grant of \$9 million was to start in January 2016.

62. HIV control can absorb major funding within a limited resource envelope. However, the country is probably at risk of an escalating HIV epidemic that may be harder to control, and without other major partners except for the GF, ADB may consider supporting HIV control. The regional health security project could target provinces not covered by GF, and also IUDs, sexually active teens, ethnic groups in hotspots, and antenatal women for screening to prevent mother to child transmission. This would also help address child rights and gender issues in Laos. An HIV Law, five-year plan 2016-2020, and other regulatory papers are being prepared, which will commit the Government to increase its financing for HIV/AIDS control in the face of reduced partner support. Government allocation for HIV/AIDS has increased more recently, but release of funds is affected by fiscal constraints.

c. Tuberculosis Control

63. The MDG for TB control has been reached but there are problems of case detection, treatment compliance, drug resistance, and financial sustainability. The TB prevalence is estimated at 540/100,000, or 35,000 infected persons, of whom about one third receive treatment, in a population of 6.6 million. About 5,900 new TB cases (all forms) are expected in 2016 (70% P+).

64. DOTS treatment is managed at district level, and drugs can be provided at health center level. Even then, treatment default rate is high. This is partly managed by VHV, but also their attrition is high. The MOH plan to introduce paid village health workers has been put on hold due to fiscal constraints. In principle, all district hospitals have a lab technologist with three-year training to diagnose TB. The provincial laboratories check microscopy samples, and the national TB control program conducts field visits three times a year. Coordination meetings between HIV and TB programs are also conducted.

65. A large pool of TB patients goes undetected and continues to spread the disease. In particular, active case finding is lacking among relatives of those with TB, HIV infected persons, in prisons, and in populations not accessing health services. TB detection campaigns are being planned. Deployment of GeneXpert and digital X-ray machines is expected to increase case

detection among high risk groups. About 70% of TB patients are also tested for HIV, and about 1.3% of TB patients have a co-infection with HIV. Not all of these have access to ARV. HIV testing is now routinely done for all TB patients, but may be affected by the new HIV Law on confidentiality and consent for testing.

66. Multi-drug resistance TB (MDRTB) poses a major threat. There are about 45-50 patients with MDRTB requiring special treatment each year. These patients are identified based on 12 selection criteria. Nine locations can test for MDRTB (three in Vientiane, Savannakhet, Champasak, Luang Prabang, Udomxay, Bokeo, Luang Namtha). The treatment period has been reduced to nine months, but requires at least three months as inpatient in Vientiane's Setthathirath hospital, which has 14 beds for this purpose. Due to lack of in-patient beds and patient access problems, there is a need to increase the number of MDRTB treatment facilities. A drug resistance survey is also proposed, as many MDRTB cases may not be identified. In view of the much higher treatment costs for MDRTB of at least \$1,400 per person plus costs of wastage compared to \$25 per person for ordinary TB, as well as higher mortality risk, control of MDRTB needs to be stepped up.

67. The two-year GF grant TB SSF for tuberculosis control of \$7,852,309 ended in June 2015, and a new two-year grant of \$7 million started in July 2015. The GF support first line treatment using standard 2RHZE/4RH protocol managed at district level in all provinces, requiring funding for 6,000 DOTS courses (plus buffer) at about \$200,000 per year. It also supports MDRTB valued at about 100,000 per year. There are funding gaps in logistic support to bring drugs to facilities training for computer software, decentralization of MDRTB treatment, and a drug resistance survey. The GF is the only remaining donor for the TB program. The Damian Foundation is pulling out its technical assistance. There is a risk of program deterioration and non-sustainability

d. Dengue control

68. Dengue hemorrhagic fever is a major public health problem in Laos that does not get much international support compared to HIV, malaria and tuberculosis. Dengue may be considered as a re-emerging infectious disease, as the incidence a spread has been increasing. Major outbreaks occur every three years. Table 2 shows the number of cases reported to NCLE, and a very low fatality rate of 0.2%. These numbers are based on reporting of selective hospitals and may miss many mild cases of dengue. At the same time, many clinical dengue cases may be some other diseases like chikungunya. So the true extent of the dengue burden is unknown.

Table 2: Reported Dengue Cases and Deaths, 1998-2013

Year	Cases	Deaths	Case Fatality Rate
1998	7671	30	0.4
1999	2507	3	0.1
2000	1377	4	0.3
2001	3968	3	0.1
2002	9177	22	0.2
2003	17600	65	0.4
2004	3414	10	0.3
2005	5446	13	0.2
2006	5610	5	0.1
2007	6853	16	0.2

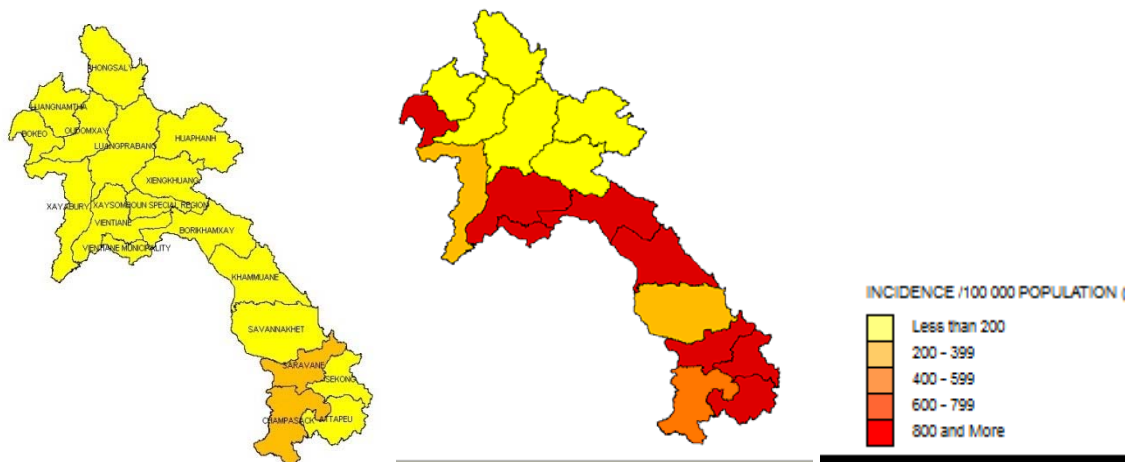
2008	2785	18	0.6
2010	22890	46	0.2
2011	3906	7	0.2
2012	9952	22	0.2
2013*	41837	93	0.2

Source: NCLE. *Up to August only.

69. What does seem clear is, as illustrated in figure 1, that dengue epidemics are increasing in size and spread. It now includes all provinces in Laos, but is most common in the south, in Champasack and Saravane provinces. It is also spreading from urban to rural areas. Dengue transmission is increasing due to higher temperatures and new subspecies of mosquitos.

70. The WHO Asia Pacific Dengue Strategic Plan (2008-2015) proposed a standard framework for dengue surveillance, integrated vector management, case management, social mobilization and communication, outbreak response, and research. Implementation of the dengue control programs have been less efficient and effective except for improvement in case management. Social mobilization to control larvae breeding sites, a key strategy in dengue control, has been less successful and is difficult to sustain in urban and rural areas. Rapid tests are a way to identify cases early at community level, but these are in short supply. New technologies have not been adopted. Vaccines trials are underway.

Figure 1: Dengue Spread, 2008 and 2013



e. Childhood Infections Control

71 Life threatening pneumonia and other severe respiratory infections are the most important causes of death among children and often follow common infections such as otitis, tonsillitis, bronchitis and influenza complicated by a deficient immune system due to malnutrition and cold. Lifesaving treatment is usually available in hospitals but not in health centers and often comes too late. While these are not considered regional diseases, they do affect population resilience and make diagnostics of EIDs complicated.

72. Based on surveys and monitoring systems, full immunization coverage remains low at around 50%. Measles, diphtheria and whooping cough may become epidemic if immunization coverage is not improved. This is despite many years of efforts to improve vaccination coverage. With the help of special campaigns and funds, polio and measles coverage are high. However, even here some villages were identified with very low immunization coverage that had cases of polio. Low immunization coverage is caused by a combination of strategy, accessibility during rainy season, cultural factors, management, and financial problems. MOH has been reluctant to increase the coverage of service delivery points. Budget allocations for the cold chain system are low. Some other vaccines are not included, and rabies vaccine and snake bite antiserum are also lacking. Even vital statistics are lacking to know the number of children to be vaccinated. External funding for EPI has been substantial with support of Japan, LuxDevelopment, GAVI and UNICEF, but partners are pulling out of routine immunization, expecting the government to take over from the regular revenue or NT2 sources. Immunization is a public good and international responsibility.

f. Control of Other Diseases

73. With the support of WHO, ADB and other partners, major progress was made in the control of neglected tropical diseases (NTDs) including multiple types of parasitic infections through mass drug administration (MDA) campaigns. This was a low cost, high impact intervention with likely major impact on child malnutrition, morbidity and mortality. International efforts to control NTDs have accelerated and Laos has high coverage of MDA. However, the causes (e.g. poor village sanitation) and consequences (including micronutrient deficiencies in women and children) of common intestinal infections including typhoid fever, dysentery, and NTDs have had less attention. The CDC2 project had made an initiative improving village conditions through the model healthy village project. This was quite successful in the Laos.

74. Diarrheal diseases are an important cause of child death. Assistance for food safety is modest. ADB supported a project for improving sanitary and phytosanitary standards for processed food for export in the GMS. Both urban and rural settings with increasing populations and wastes need much better sanitation in public places, requiring better policy, regulation and control measures including possibly legal actions. The project will need to consider if it is within the scope to strengthen government strategy and pilot control measures in the field of food safety.

75. Hand, foot, and mouth disease (HFMD), mainly affecting children below ten years of age, has been occasionally reported from Laos. It is caused by a non-polio enterovirus and transmitted through unhygienic practices. The extent of several other diseases of regional importance is less known in Lao including brucellosis, leptospirosis, and scrub typhus, which are common in South East Asia. Encephalitis and meningitis also cause considerable morbidity and mortality, and are linked to similar outbreaks in neighboring countries.

IX. HEALTH SYSTEM CAPACITY

a. Health Sector Performance

76. At present, about 90% of the population has access to basic primary health care including basic health care and medicine at village level, and about 60% of the population has access to timely and adequate referral services including an urban population of 30%. However, demand for health services is low, and about half the population is not using public health facilities, probably due to issues of quality and affordability of services.

77. External factors contributing to health services issues are low population density, poor rural access road network, weak education systems, and years of very low health spending that has undermined sector capacity. Internal factors contributing to underperformance in the health sector are an underperforming, poorly distributed workforce; lack of recurrent funds, lack of basic rural facilities; informal charges, and a range of governance and management problems.

78. The IHR core capacities, in particular IPC, depend on overall standards of public health services. This is not much captured in IHR evaluation instruments (including financing IHR for example!). The general performance of public health services may well prevent Lao from achieving IHR standards. Accordingly, the UHC agenda is essential for Laos's public health security.

79. Current sector development efforts have been imbalanced and often short term driven by demand for quick impact. Leadership capacity in MOH is limited and fragmented based on departmental silos. Data management is weak with lack of institutional memory. Development partners have contributed to fragmentation through support for vertical programs

80. The government has realized the serious underfunding of the health sector and has committed up to 9% of public spending for health, but based on conditions that will make it difficult to access these funds given current sector constraints and require adjustments like rolling plans and budgets. The government, realizing that the health sector is seriously lagging behind, is supporting MOH to carry out a major Health Sector Reform (HSR) program towards Universal Health Coverage (UHC) by 2030. A HSR framework has been formulated, and ADB, the World Bank, Lux Development, Japan, Korea, WHO and other partners have committed their support.

81. Major features of the HSR agenda are improved sector governance, human resources for health, health financing, service delivery, and health information system. Among others, major ongoing efforts will be supported such as improving provincial planning, upgrading health staff, health equity funds and free MNCH, financial management, computerized HIS, towards universal health coverage by 2020. High level Government oversight has been put in place and a roadmap has been formulated and detailed reforms are being prepared.

82. However, MOH is facing major challenges in carrying out this HSR, including funding constraints, limited MOH capacity and need for technical assistance, and insufficient mainstreaming and commitment of the HSR agenda. A particular concern is that the HSR process remains fully government owned, and at the same time adopts a participatory approach including partners, NGOs and the private sector. A special risk is that partners press MOH to develop design solutions that are possibly globally correct or reflect the latest policy developments but are too ambitious for the Lao health sector.

b. District Health Information System

83. The roll out of a nationwide DHIS, based on the Oslo software, is supported by WHO and WB for the past 5 years or so. It has been rolled out in all 18 provinces. MCH monitoring has been integrated in the DHIS.

84. The general plan is to include some general CDC indicators in DHIS, in addition to specific program monitoring that will need to continue. Nation-wide malaria surveillance is proposed to be included in DHIS using two malaria indicators to identify hotspot. According to

the HIV team, the desire is to integrate HIV into general CDC, and such a plan exists but is yet to be implemented.

85. Eventually, the idea is to make DHIS demand driven rather than supply driven, in that it will be monitoring what is required, e.g. core services, and a basket of specific services in hotspots based on needs, not only for CDC. DHIS is still not so strong, and provincial data use is limited, as well as statistics capacity at central level. Monitoring of fund use at provincial level is also limited.

X. PROJECT SCOPING

a. Key Features

86. The overall drivers of the project are (i) to prevent or control EIDs and other infectious diseases of regional importance in a timely manner; (ii) enable the Laos diagnostic system to provide accurate results in a safe and timely manner, thereby improving the health of patients and providing value for money; and (iii) reducing the risk of the spread of highly infectious diseases, nosocomial infection and drug resistance by improving biosafety.

87. The project builds on Laos's commitment for regional cooperation in the context of GMS and ASEAN, and for universal health coverage. The project will support the implementation of regional disease control strategies by addressing current gaps based on evaluation of APSED and national disease control legislation and strategies.

88. The project also builds on the government's plans for health sector reform (HSR) to provide universal health coverage (UHC) for all citizens by 2030. Common reasons for people not using health services are lack of access, affordability, acceptability and quality of services. Health equity funds (HEF) have been chronically underfunded, so out-of-pocket costs have been high, resulting in income erosion and impoverishment. A major investment is earmarked for human resources development and other quality improvement. This has to go along with improvements in health sector governance supported by ADB, the World Bank and other partners. Public health security is seriously affected by current health system constraints. HSF needs to consider prioritizing security-relevant reforms, such as improving affordability of health services, posting competent staff to rural health centers, strengthening community reporting, and hospital hygiene.

89. Vulnerable groups like migrants and remote ethnic groups, while exposed to infectious diseases, use services much less, thereby constituting both a risk for themselves and the general public. These communities likely have a high burden of communicable diseases including HIV, tuberculosis, malaria, dengue, and NTDs. Engaging these communities for prevention, surveillance and response provides an opportunity to improve case finding and treatment of these conditions using existing disease control programs in nearby health facilities. For Laos to improve its public health security and achieve universal health coverage, it has to reach out to these communities. In addition to improving the basic network of hospitals, health centers and village health volunteers (VHV), this needs additional outreach services, Government plans to upgrade VHVs to village health workers (VHWs) would also help. Outreach depends on motivated staff, and financial and logistic support, that will need to be sustained.

90. Based on experiences gained in CDC1 and CDC2, MOH and provincial health offices, led by DPIC and DCDC, have considerable capacity to implement and administer CDC projects.

However there are risks of fragmentation and weak cooperation among departments, and a and levels, and a top-down approach. HSF needs to consider putting in place a more programmatic approach to improving public health security as part of UHC. In addition to setting up coordinating mechanisms for project implementation, MOH capacity building for public health security needs to be mainstreamed across all departments. However, the current focus of governance reforms is focused on general sector coordination, financing, HRD and PHC. A working group for public health security co-chaired by WHO may be a way forward.

91. Public health security and in particular also control of HIV/AIDS, tuberculosis and malaria are highly dependent on external funding and even then have inadequate funds. Partners including ADB, the GF, the European Union, Japan, LuxDev, and the World Bank have provided large quantities of equipment and matching funds for operations such as for utilities, laboratory reagents and point-of-care tests for rapid diagnostics have been inadequate. Government financing of non-salary recurrent budget has been grossly inadequate and vulnerable to cuts due to cash flow and liquidation problems, causing considerable inefficiencies. While recurrent cost implications of this project are small, making proper use of past investment requires MOH to prioritize providing operations budget for health services. For public health security, the system is as good as its weakest link. One epidemic can easily consume the entire health budget for years.

b. Role of ADB

92. ADB has assisted IHR/APSED implementation and CDC in the GMS since 2000. The first GMS Regional Communicable Diseases Control (CDC) Project, 2004-2009, and the Second Regional Communicable Diseases Control (CDC2) Project, 2010-2015 focused on (i) strengthening the national communicable disease surveillance and response system; (ii) improving laboratory services; (iii) control of dengue and neglected tropical diseases (NTDs); (iv) provincial capacity building in planning and training for CDC; (v) community-based CDC in border districts, focusing on lagging villages; and (vi) strengthened regional cooperation capacity for CDC. Currently ADB also provides GMS support for malaria and HIV control, food safety, and improving resilience to climate change. The ADB Regional Malaria Initiative supports GMS capacity building and artemisinin-resistant malaria control.

93. CDC1 was evaluated as satisfactory by ADB's Independent Evaluation Department, while noting a concern about sustainability. ADB support to finance the GMS Health Security project will take into consideration the performance of CDC2 and malaria and HIV projects. CDC2 is progressing well, but surveillance and response, laboratory services and dengue control remain fragile due to quality and system constraints. Deworming has high coverage. The model healthy villages in remote border areas is being rolled out with difficulty due to access problems and provides important insights into strengthening CDC in border areas. The CDC2 provincial training capacity building to counter ad hoc vertical training programs is being mainstreamed. Regional and cross-border cooperation is making slow progress in agreeing on SOPs for regional and cross-border information sharing and disease control.

94. Lessons learned from CDC projects include (i) the challenge of reaching vulnerable groups including mobile and migrant populations through government services; (ii) the need to improve quality of services; and (iii) the need to institutionalize and standardize outbreak response.

c. Indicative Project Scope

95. The proposed **project goal** is to strengthen GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities; (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year; and (iii) increased use of public health services in border areas by MEVs. The proposed **project outcomes** are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas.

96. The proposed **project outputs** are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases.

97. The proposed **project targets** 12 provinces out of a total of 18. Eleven of these 12 provinces are border provinces, comprising a total of 36 border districts out of 55 districts. The selected provinces are: Bokeo, Luangnamtha, Udomxay, Phongsaly, Xiengkhuang and Huapanh in the north bordering Thailand, Myanmar, PRC (Yunnan), and Viet Nam; Bolikhamsay and Khammuane in the center bordering Thailand and Viet Nam, and Attapeu, Saravane, Sekong and Champasack in the south bordering Thailand, Cambodia and Viet Nam. With the exception of Champasack, these are among the poorest and least developed provinces of Laos.

98. The Project components are:

(i) **Strengthened regional, cross-border, and intersectoral CDC.** MOH has made progress with regional information sharing and cross-border cooperation for CDC. However, this needs to be mainstreamed and formalized. In addition, some groups of MEVs that are more likely to get and spread infectious diseases are not using regular health services. Under this component, it is proposed that the project (i) supports regional, cross-border, and inter-sectoral information sharing and coordination of outbreak control among GMS countries, (ii) develops regional disease control strategies and evidence-based CDC, and (iii) improves CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for joint planning and monitoring; and outreach and community mobilization to reach and engage MEVs.

(ii) **Strengthened national disease surveillance and outbreak response.** MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis is strong. However, the system needs to be further computerized and extended to communities by employing syndromic reporting. Linkages or integration among surveillance systems will also be improved. MOH also needs to improve capacity for disease outbreak response. Under this component, it is proposed that the project supports (i) syndromic reporting at community level; (ii) web-based reporting including information technology support; (iii) integration of surveillance systems; (iv) risk analysis, communication, and community preparedness; (v) improving capacity of outbreak response teams including transport; and (vi) improving screening and quarantine capacity at border posts of entry and international quarantine centers. Support is needed for system design, computers, training, and vehicles and equipment for outbreak control.

(iii) **Improved laboratory services and hospital infection prevention and control.** District facilities are unable to comply with internationally acceptable levels of biosafety

or to guarantee the accuracy of their laboratory testing. Underlying problems are substandard training of laboratory staff, lack of quality control, and insufficient facilities, equipment, and supplies. The quality assurance system is in a nascent stage, and there is no national laboratory audit system. Nosocomial or hospital-acquired infections are becoming a major public health problem. Under this component, it is proposed that the Project supports (i) improving quality assurance, (iii) in-service training, (iv) improving district laboratory services, and (iv) equipment and training for infection control and case management of dangerous diseases.

99. The project is proposed to target 12 provinces on the basis of less endowed provinces and importance for communicable diseases control being along economic corridors including in the north Bokeo, Louang Namtha, Phongsali, Oudomxay, Xiangkhouan and Huaphanh, in the central Bolikhamsay and Khammouane provinces, and in the south Saravane, Sekong, Attapeu, and Champasack provinces. Within these provinces, provincial and district hospitals will be targeted for services, and MEVs in border districts will be targeted for community-based interventions.

d. Indicative Management Arrangements

100. Of the total estimated project costs of \$12.6 million, ADB is requested to finance \$12.0 million through an \$8 million grant and \$4 million ADF soft loan window including taxes. The government will finance \$0.6 million as counterpart funds for project management. The project is to be financed under the umbrella of the GMS economic development program supported by ADB, with two third of funding coming from the regional set-aside.

101. The Ministry of Health is the executing agency (EA). The Department of Planning and International Cooperation (DPIC) will coordinate administration and implementation. Implementing agencies are the Department of Communicable Diseases Control including the NCLE, the Department of Health Care, and 12 provincial health offices. The project will be implemented over a period of 5 years, from January 2017 to December 2022.

e. Safeguards and Risks

102. The proposed project's gender categorization is "effective gender mainstreaming." A gender strategy and action plan has been prepared and a gender expert is to be engaged. Among others, active engagement of the Laos Women's Union is proposed to mobilize communities and reach at risk groups.

103. Ethnic minorities in the proposed project areas will be positively affected given the type of project activities. The proposed project is initially categorized B for indigenous people because of the risk that intended project benefits for MEVs are not realized. An ethnic group development plan (EGDP) was prepared. A Chief Technical Advisor will be engaged to help mitigate this risk.

104. The proposed project is initially categorized as B for environment, as it involves improving laboratory and hospital waste management. Each province will need to prepare an environmental management plan.

105. The project will not entail land acquisition. The proposed project is initially categorized C for involuntary resettlement. A resettlement framework has been prepared in case there is any change of scope.

106. There are no major technical risks in the proposed project for Laos. The project performance will to a large extent depend on the capacity of the PMU in DPIC.

107. The financial management assessment (FMA) was conducted in March, 2016 in accordance with ADB's *Guidelines for the Financial Management and Analysis of Projects and the Financial Due Diligence: A Methodology Note*. The FMA concluded that the financial management risk was moderate. A particular risk is slow administrative processes both in MOH and MOF. Hence, a financial risk management plan needs to be prepared. To ensure that loan proceeds are disbursed in accordance with ADB's *Loan Disbursement Handbook*, online training for project staff on disbursement policies and procedures is available.¹⁰

108. The procurement risk assessment concluded that procurement risk was moderate. Provinces lack capacity for procurement of laboratory equipment. Accordingly, all major procurement will be done centrally. Provinces will do the repairs of facilities from their own sources, as counterpart contribution, and procure their own laboratory supplies and reagents. International consulting services to mitigate these risks will need to include laboratory and procurement experts.

109. Overall, the proposed project is considered to be low-risk for Laos in terms of (i) technical investments; (ii) safeguard categorization B or C; and (iii) good cooperation and support for provinces and partners. It may be classified as moderate for administrative aspects in view of MOH staff constraints.

XI. CONCLUSIONS AND RECOMMENDATIONS

a. Conclusions

110. Southeast Asia is an epicenter of EIDs and other diseases and drug resistance of regional relevance with potentially major human, economic, and poverty impact. Regional cooperation is required for communicable diseases that rapidly spread across borders. Countries in the GMS are committed to build resilient national health systems and strengthen regional cooperation based on the IHR and APSED.¹¹ Regional cooperation also has benefits in terms of control of other infection diseases of regional significance such as HIV/AIDS, tuberculosis, malaria and dengue, and leverage national control efforts.

111. Collecting information from government, field visits and partners, the consultant estimated that about 66% of IHR core capacities are in place. There are multiple access, human resource, technical, and financial constraints. The HIV/AIDS, tuberculosis and malaria programs are better resourced but also fall short of covering MEVs. It should be kept in mind that, although the burden of NCDs in adults is high, common infectious diseases cause most mortality among children and the poor in Laos. Efforts to improve high priority public health security and disease control programs will also help reduce this burden, and synergies should be explored and exploited.

112. Country level efforts to improve IHR core capacities with support of WHO have centered around MOH core capacities. Participation of communities, other ministries, private sectors, and

¹⁰ Disbursement eLearning. http://wpqr4.adb.org/disbursement_elearning.

¹¹ World Health Organization. *International Health Regulations*. 2005. Geneva. WHO South-East Asia Regional Office (SEARO) and Western Pacific Regional Office (WPRO). *Asia Pacific Strategy for Emerging Diseases (APSED)*. 2010. Manila.

other countries appears to be less. In particular, more effort needs to be made in reaching MEVs which may well be the weak link in the surveillance and response system. These MEVs are also more likely to have a higher burden of infections of regional significance. Achieving both public health security and UHC will require reaching these MEVs.

113. This rather long-term regional capacity building scenario is complicated by disturbing new information on regional diseases. Drug resistance may undermine treatment of HIV, tuberculosis and malaria, not only affecting patient survival, but allowing easier spread of the diseases. More disturbing information comes from the recent EHF outbreak in West Africa, where patients were found to be infective long after their recovery, and continued to harbor the virus in eyes and testis. This implies that people who had EHF can potentially cause a new outbreak much later. This may also be the case for other EIDs. At the same time, there is no national or even global surge capacity for a major epidemic. The implication is that absolute priority should be given to early identification and investigation of any suspected outbreak at community level using event-based or syndromic reporting, in addition to other measures such as indicator-based surveillance, general hygiene and infection control, screening mobile people, and isolation of suspected cases.

114. ADB is a financing institution with limited staff capacity and works closely with the World Bank on governance and WHO, IOM and other UN agencies on technical matters. ADB brings regional and multisectoral experience, and has been supporting the GMS Economic Development Program and has gained considerable experience with GMS CDC projects. ADB has substantial experience in the Laos health sector, which is considered low risk for ADB health projects.

115. Given these challenges, opportunities, risks, and constraints, the PPTA team conducted sector analysis to identify priorities for improving regional health security and CDC of regional relevance, prepare the technical situation analysis for the interim report, and develop the project design. Based on the initial project scope, proposed priority areas are regional cooperation and knowledge management, disease control for MEV, broadening and computerizing the surveillance and response network, improving biosafety and quality of laboratory services, and rolling out IPC.

116. Institutional challenges for improving public health security are sector fragmentation among programs and levels, and staff constraints, in particular for NCLE. Technical challenges are to harmonize information and control strategies in the GMS, increase cross-border cooperation and border control, reach MEVs in border areas and along economic corridors, integrate national surveillance systems, ensure appropriate procurement of equipment based on needs and capacity of districts, and establish structures and support for IPC in health facilities.

117. Substantial risks were identified in terms of not reaching priority target populations, in particular ethnic minorities and migrants, due to government strategic and operational constraints. Other risks concern procurement and financial management. However, the major risk for Laos is probably outside the project area, which is the overall weakness of the health system, on which public health security has to build. This is beyond control of this project, and the project therefore needs to be closely tied with general efforts to improve health services.

b. Recommendations

118. The sector analysis supports the proposed project scope as it responds to major health and economic threats, is based on IHR/APSED, supports government priorities, supports MOH

policy and plan, supports reaching out to those not being reached as the main concern of public health security and tie to UHC, reflects integration of CDC under one umbrella to improve sector efficiency and effectiveness in anticipation of expected changes in aid funding, and proposes mitigating actions for identified implementation risks.

119. It is recommended that the Project has a strong focus on neglected border areas, meaning those border areas where there are no government or NGOs providing services. The government may want to explore using its own provincial/district teams to improve outreach in these areas, or contracting out, whatever is most suitable for the local setting. Reaching MEVs will require strong leadership, participatory planning and monitoring, and logistics at district level.

120. Major implementation constraints in MOH need to be addressed. Given staff constraints and financial management and procurement risks, a PMU is proposed to facilitate engagement of contractual staff and administrative, technical, and field support. The purpose of the PMU should be institutional and staff capacity building.

c. Preparatory Work

121. Data collection involved:

- (i) review of plans, reports and surveys of MOH, institutions, networks, and partners available on internet or from the agencies;
- (ii) field visit to targeted provinces to collect information on the provincial health systems using checklists, interviews and group discussions;
- (iii) completion of questionnaires and checklists for IHR/APSED, laboratory, FMA, PRA, gender, indigenous people, and environment; and
- (iv) discussions and workshop with representatives of government, community agencies and partners.

122. The Government, including the Ministry of Planning and Investment (MPI), and the Ministry of Finance, requires sufficient information to be able to process the project, including detailed scope with project activities and budget. It would be useful to prepare the first year annual operational plan for the project and ensure that it is included in the MOH and provincial budgets.

123. Gender, safeguards and risks assessments are in line with current sector views. Project gender, safeguards, and risk mitigation plans have been prepared, for endorsement by MOH and state/region health offices. Each provincial health office will carry out site specific Initial Environmental Examinations (IEEs) for its health facilities to receive project support according to ADB's environmental policy. MOH will also hold site specific public consultations with potentially affected groups. Each provincial health office will prepare an environmental management plan (EMP) based on proposed provincial project activities. The EMP will be submitted to MOH, other related government agencies, and ADB for review and concurrence.

Appendixes

1. Basic health and health services data of targeted provinces
2. Problem Tree
3. Results-Framework

Appendix 1: Lao GMS Health Security Project: Data Project Provinces

Demographic Data Project Provinces

No.	Province Name	Districts	Population	Poverty village		
1	Phongsaly	7	180,861	263		
2	Luangnamtha	5	173,244	96		
3	Oudomxay	7	315,387	124		
4	Bokeo	6	174,023	5		
5	Huaphanh	8	322,220	116		
6	Xiengkhuang	8	252,334	128		
7	Borikhamxay	6	274,732	42		
8	Khammuane	10	330,000	28		
9	Saravane	8	336,600	194		
10	Sekong	4	84,995	159		
11	Champasack	10	705,438	84		
12	Attapeu	5	136,162	78		
	Total	84	3,285,996	1,310	National Poverty Reduction report 2014 (MoPI)	

Health Data Project Provinces

No.	Province Name	UFM	% Mal nutrition	% Full Immunization	Top two infections	Notable infections
1	Phongsaly		19.8	93.9	DD,ARI	Polio,
2	Luangnamtha		1.3	74	DD,ARI	Measles,
3	Oudomxay		1.1	74	DD,ARI	Diphtheria,
4	Bokeo		3.8	55	DD,ARI	Pertussis,
5	Huaphanh		2.3	32.3	DD,ARI	Tetanus,
6	Xiengkhuang		4.4	39.9	DD,ARI	Dysentery
7	Borikhamxay		1.4	74	DD,ARI	Typhoid,
8	Khammuane		1.9	52.8	DD,ARI	Jaundice,
9	Saravane		3.6	29.7	DD,ARI	Food poisoning
10	Sekong		1.8	68	DD,ARI	Encephalitis,
11	Champasack		0.71	58	DD,DF	Meningitis,
12	Attapeu		3.8	71	DD,DF	Antrax

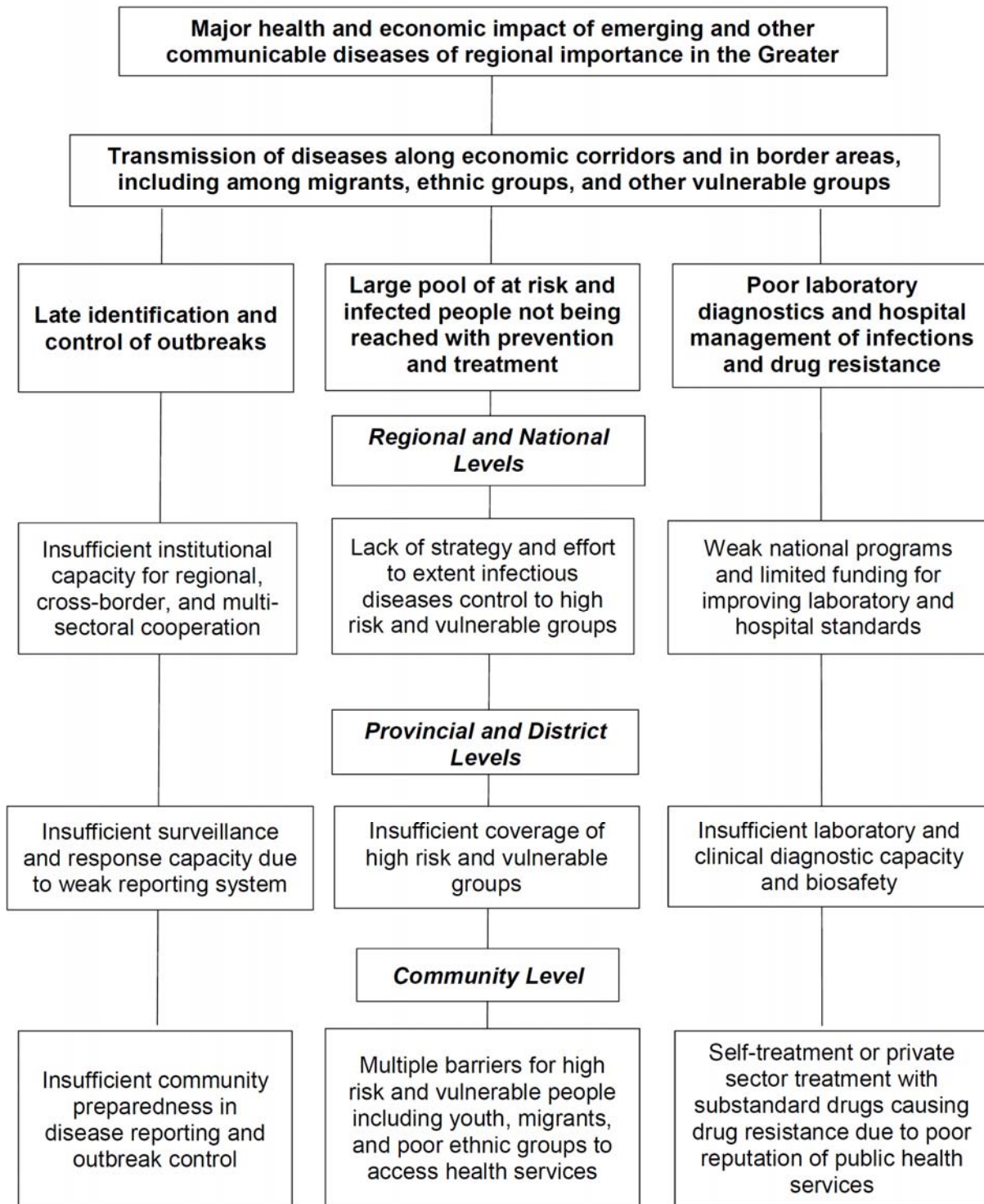
Source: provincial health offices. Data from 2015.

DD=diarrheal diseases; ARI=acute respiratory infections; DS=dysentery; DF=Dengue fever,

Data Project Districts

Province Name	District Name	No Villages	Total Population	Border	% Ethnic
Phongsaly	Phongsaly	82	37,408	China	95%
	May	78	23,596	Vietnam	99%
	Samphanh	78	26,877	Vietnam	95%
	Boon neua	70	18,952	China	91%
	Nhot ou	91	27,177	China	98%
	Boontai	57	16,619	China	97%
Luangnamtha	Namtha	69	44,584	China	85%
	Sing	85	30,790	China	85%
	Long	75	28,705	Myanmar	80%
Oudomxay	Xay	89	68,726	China	75%
	Namor	68	34,833	China	95%
Bokeo	Huoxai	98	68,380	Myanmar	65%
	Tonpheung	51	27,186	Myanmar	70%
	Meung	23	13,287	Thailand	65%
	Paktha	47	20,254	Thailand	75%
Huaphanh	Xiengkhor	58	29,115	Vietnam	68%
	Viengthong	65	26,392	Vietnam	64%
	Viengxay	113	35,741	Vietnam	72%
	Huameuang	74	30,820	Vietnam	54%
	Xamtay	145	57,901	Vietnam	59%
	Sopbao	58	27,735	Vietnam	74%
	Add	65	27,324	Vietnam	67%
Xiengkhuang	Nonghed	85	39,432	Vietnam	45%
	Morkmay	27	13,458	Vietnam	52%
Borikhamxay	Xaychamphone	38	37,401	Vietnam	34%
	Khamkheuth	75	66,403	Vietnam	41%
	Viengthong	41	31,573	Vietnam	38%
Khammuane	Bualapha	56	30,219	Vietnam	29%
	Nakai	38	27,845	Vietnam	59%
Saravane	Ta Oi	44	34,208	Vietnam	87%
	Toomlarn	53	32,272	Thailand	65%
	Samuoi	44	20,250	Vietnam	92%
Sekong	Kaleum	37	19,169	Vietnam	87%
	Dakcheung	65	29,413	Vietnam	85%
Champasack	Paksxong	65	71,045	Thailand	73%
	Pathoomphone	63	57,170	Cambodia	65%
	Moonlapamok	45	47,125	Cambodia	43%
	Khong	79	85,319	Cambodia	42%
Attapeu	Sanamxay	36	32,649	Vietnam	75%
	Sanxay	34	22,194	Cambodia	68%
	Phouvong	23	14,720	Vietnam & Cambodia	43%
12	41	2587	1,434,267	All border districts	959,410 (67%)

Appendix 2: PROBLEM TREE



Appendix 3: RESULTS FRAMEWORK

GMS Health Security Sector Outcomes		GMS Health Security Outputs		ADB GMS Health Sector Operations	
Impact/Outcomes with ADB Contribution	Indicators with Targets & Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Contributions
<p>Impact by 2025:</p> <p>GMS public health security enhanced</p>	<p>Impact indicators</p> <p>Zero major outbreaks of emerging or other epidemic disease in excess of 100 fatalities</p> <p>Outbreaks have less than 0.5% impact on GDP in any quarter of the year</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas receiving treatment for HIV and TB doubled</p> <p>Outcome indicators</p> <p>IHR/APSED compliance increases from 70% to 90% average</p> <p>Coverage of disease control interventions in MEVs increases from 60% to 80% average</p>	<p>Enhanced GMS collaboration and CDC in border areas by 2020:</p> <p>Strengthened national surveillance and response system by 2020</p> <p>Improved diagnostic and management capacity of infectious diseases by 2020:</p>	<p>GMS countries report all suspected cases of notifiable communicable within 24 hrs (from zero)</p> <p>Each province conducts cross border and intersectoral disease control activities</p> <p>MEVs reached with CDC programs doubled by 2020</p> <p>By 2020, all targeted public hospitals conduct web-based reporting of notifiable diseases within 12 hrs and case investigation within 24 hrs compared to 80% in 2014</p> <p>Targeted laboratories meeting national quality and biosafety standards increases from 30% to 60%</p> <p>Targeted hospitals meeting 60% of IPC and case management standards increased from 30% to 80%</p>	<p>Planned key activity areas:</p> <p>GMS Health Security Project \$125 million:</p> <p>Cambodia \$21.0 million ADF loan;</p> <p>Laos \$8 million grant and \$4 million ADF loan</p> <p>Myanmar \$12.0 million ADF loan</p> <p>Viet Nam \$80.0 million ADF loan</p> <p>ADB Projects in the pipeline with estimated amounts:</p> <p>tbd</p> <p>Ongoing ADB projects with approved amounts:</p> <p>Second GMS CDC Project \$63.5 million</p> <p>Strengthening HIV Prevention Capacity in the GMS Project \$20.3 million</p> <p>Regional Capacity Building TA for Malaria Elimination and CDC capacity building Project \$17.2 million</p>	<p>Planned key activity areas:</p> <p>Regional, cross-border and intersectoral collaboration for CDC among all GMS countries; including joint planning to reach MEVs;</p> <p>Outreach program to link MEVs with CDC program</p> <p>Web-based surveillance system including community syndromic reporting, and rapid outbreak response</p> <p>Laboratories with better biosafety and quality of diagnostic tests</p> <p>Hospital with better infection prevention and control and case management of infectious diseases</p> <p>Planned projects:</p> <p>tbd</p> <p>Ongoing projects:</p> <p>HIV prevention</p> <p>Malaria control</p>
<p>Outcome by 2020:</p> <p>GMS Health Security System achieved IHR/APSED standards</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas accessed services for communicable diseases control (CDC)</p>					

Source: ADB.

CDC = Communicable Diseases Control; GMS = Greater Mekong Subregion; HMT = HIV/AIDS, Malaria and Tuberculosis

Myanmar Health Sector Analysis

Project number: 48118-REG

R-PPTA 8842: THE GREATER MEKONG SUBREGION HEALTH SECURITY PROJECT

2016

Table of Content

Acronyms	2
SUMMARY	4
I. INTRODUCTION	6
a. <i>Purpose of Analysis</i>	6
b. <i>Global Health Threats</i>	6
c. <i>Public Health Security</i>	7
d. <i>Country Context</i>	9
II. PUBLIC HEALTH SECURITY PROGRAM	11
a. <i>The Challenge</i>	11
b. <i>Organization and Plan</i>	12
c. <i>IHR/APSED Evaluation</i>	13
d. <i>Surveillance and Response</i>	16
e. <i>CDC in Border Areas</i>	18
f. <i>Laboratory Services</i>	18
g. <i>Hospital Infection Prevention and Control</i>	19
h. <i>Regional Cooperation</i>	21
III. MAJOR COMMUNICABLE DISEASES	22
a. <i>HIV Control</i>	22
b. <i>Tuberculosis Control</i>	23
c. <i>Malaria Control</i>	24
d. <i>Dengue</i>	25
e. <i>Other Communicable Diseases</i>	25
IV. PROJECT SCOPING	26
a. <i>Strategy and Program</i>	26
b. <i>Proposed Project Scope</i>	29
c. <i>Proposed Project Management and Issues</i>	31
d. <i>Safeguards and Risk Management</i>	32
V. ADMINISTRATIVE ASPECTS	34
VI. CONCLUSION AND RECOMMENDATIONS	36
a. Conclusions	36
b. <i>Recommendations</i>	37
c. <i>Preparatory Work</i>	38
Appendixes	38
<i>Appendix 1. Myanmar Health Sector Summary</i>	39
<i>Appendix 2 : GMS HEALTH SECURITY PROJECT</i>	52
<i>Appendix 3: PROBLEM TREE</i>	71
<i>Appendix 4: RESULTS FRAMEWORK</i>	72

Acronyms

ADB	Asian Development Bank
AIDS	acquired immunodeficiency syndrome
APEC	Asia Pacific Economic Community
APLMA	Asia Pacific Leaders Malaria Alliance
APSED	Asia Pacific strategy for emerging diseases
ART	Anti-retroviral treatment
ASEAN	Association of South-East Asian Nations
CDC	communicable diseases control
CDC1	GMS communicable diseases control project
CDC2	second GMS communicable diseases control project
CDRR	communicable diseases of regional relevance
CEU	Central Epidemic Unit
CLMV	Cambodia, Lao PDR, Myanmar, Viet Nam
CODEX	Codex Alimentarius
COP	community of practice
DMS	Department of Medical Services
DOTS	direct observed treatment – short course, for tuberculosis
DPH	Department of Public Health
DPT	diphtheria, pertussis, and tetanus
DUNS	diseases under national surveillance
EBS	event-based surveillance
EGDP	ethnic group development plan
EHF	Ebola hemorrhagic fever
EID	emerging infectious disease
EIS	epidemic intelligence surveillance
EMP	ethnic minority plan
EPI	expanded program on immunization
EQA	external quality assurance
EWARS	early warning and response system
FDA	Food and Drugs Authority
FETN	field epidemiology training network
FETP	field epidemiology training program
FP	family planning
FSW	female sex workers
GAVI	Global Alliance for Vaccines and Immunization
GDP	gross domestic product
GFHMT	Global Fund to Fight or HIV/AIDS, Tuberculosis, and Malaria
GMS	Greater Mekong Subregion
HepB	Hepatitis B
Hib	hemophilus influenza type B
HIS	health information system
HIT	health in transition publication
HRD	human resource development
HIV	human immunodeficiency virus
IATA	International Air Transport Association
IBS	indicator based surveillance
IEC	information, education and communication
IMR	infant mortality rate
IDU	injecting drug users

IEE	initial environmental examination
IHR	international health regulation
IPC	infection prevention and control
Lao PDR	Lao People's Democratic Republic (Laos)
MBDS	Mekong basin disease surveillance
MCH	maternal and child health
MDA	mass drug administration
MDG	millennium development goal
MDRTB	multi-drug resistant tuberculosis
MEDP	Myanmar essential drug project
MERS	middle-east respiratory syndrome
MEV	migrants and mobile people, ethnic minorities, and other vulnerable groups
MMA	Myanmar Medical Association
MMP	mobile and migrant population
MNCH	maternal, newborn and child health
MOH	Ministry of Health
MOU	memorandum of understanding
MMR	maternal mortality ratio
MSM	men having sex with men
NAP	national AIDS program
NCD	non-communicable diseases
NCDP	national comprehensive development plan
NDPCC	national development program coordinating council
NHP	national health plan
NFP	national focal point (for IHRAPSED)
NHL	National Health Laboratory
NGO	nongovernmental organization
OIE	World Animal Health Organization
PHC	primary health care
PLHIV	persons living with HIV
PMU	project management unit
PPE	personal protective equipment
POE	port-of-entry
PPTA	project preparatory technical assistance
RCUS	regional cooperation unit
REC	reaching every community strategy for MNCH
RRT	rapid response team
SARS	severe acute respiratory distress syndrome
SOP	standard operating procedure
SDP	sustainable development goal
STD	sexually transmitted diseases
STH	soil transmitted helminthiasis
TEPHINET	training program in epidemiology and public health interventions
UHC	universal health coverage
UNDP	United Nations Development Program
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
WHO	World Health Organization
3DF	Three Diseases Fund
3MDGF	3 MDG Fund

SUMMARY

The Governments of Cambodia, Laos, Myanmar and Viet Nam are considering support from the Asian Development Bank (ADB) for the Greater Mekong Subregion (GMS) Health Security Project (the project). A health analysis was prepared as part of project preparatory technical assistance (PPTA). This entailed review sector documents, provincial field visits, collection of information using questionnaires, and discussions of findings and proposed scope with representatives and stakeholders. The report was prepared by the Myanmar Health Specialist and the PPTA Team.

Emerging infectious diseases (EIDs) like avian influenza, SARS, MERS and Ebola hemorrhagic fever and recurrent diseases like cholera have the potential to spread quickly around the globe, with major economic and sometimes devastating human impact. Other diseases of global importance like HIV, TB, malaria, and dengue spread less quickly but do not stop at borders and cause major impact at household level. Drug resistance is potentially one of the most threatening emerging problems to deal with common bacterial infections, STDs, HIV, malaria, tuberculosis, and nosocomial infections.

Myanmar, with a population of almost 60 million in 2016, has emerged from years of military rule and is in the process of political, institutional, economic and social reforms. Connectivity, foreign investment, and industrialization are increasing rapidly, resulting in major migration and rapid urbanization.

Located in the GMS, an epicenter of several EIDs, Myanmar is highly vulnerable to outbreaks and epidemics of infectious diseases.. It has long borders and increasing connectivity, a large burden of infectious diseases that spreads across borders including malaria, tuberculosis, and dengue, and a concentrated HIV epidemic cause major impoverishment. Common infections such as diarrheal diseases and pneumonia still cause most childhood mortality. Hospital-based infections and drug resistance are of particular concern in Myanmar due to a large informal health sector.

A substantive but seriously underfunded national network of health services is in place. However, people in border areas, including those living in conflict zones, migrants, the poor, and isolated ethnic groups, and probably also migrants in industrial zones and plantations make less use of health services provided by either the government or other health services agencies. This contributes to gaps in the preparedness, surveillance, and response for EIDs and other infections that can spread rapidly, and in the management of infectious diseases in general.

To improve public health security, Myanmar is committed to achieve core capacities based on the International Health Regulations (IHR) 2005 and implement the Asia Pacific Strategy for Emerging Diseases (APSED) 2010, as well as the regional strategies for the control of dengue, malaria, tuberculosis and HIV/AIDS. Despite major political commitments and support from partners, health system capacity to deal with EIDs and other health threats is inadequate.

Public health security is as good as its weakest link, and also depends on general health systems coverage and quality. A considerable network of public health facilities has been put in place. However, health service delivery, demand for health services may be low due to problems of quality and affordability of services. The sector has been seriously underfunding resulting in high out-of-pocket payment with impact on poverty and health.

The TA team estimates Myanmar's IHR core capacities at about 60%. Major shortcomings were in preparedness, communication, ports of entry, and in monitoring for chemical and radiological hazards. Major strengths were in coordination and in communication for the control of zoonosis. Disease surveillance, which is at the core of IHR, is assisted by the World Health Organization and improving. In general, MOH needs to improve surveillance and response linkages with communities, non-health sectors, cross-border, and other countries.

To assist Myanmar meet its obligations under IHR/APSED and a number of other treaties and agreements, it is proposed that the project supports expanding the surveillance and response system including risk analysis, GMS and cross-border cooperation, port-of-entry services, piloting syndromic reporting at village level, and community preparedness; and help strengthen the public health system in terms of laboratory services and hospital infection prevention and control (IPC) in 6 state/region capitals and 6 border townships along Myanmar's eastern border.

The Ministry of Health (MOH) will be the executing agency. The Departments of Public Health (Central Epidemiology Unit) and the Department of Medical Services (National Health Laboratory, IPC Program, and Central Medical Stores) will manage the Project. In view of capacity constraints, a project management unit (PMU) is proposed. The 6 state/region health offices (Shan North and East, Kayah, Kayin, Mon and Tanintharyi) will be implementing agencies. The total project costs for Myanmar from 2017 to 2022 are estimated at \$14.9 million, of which \$14.5 million is proposed to be financed by ADB.

The main project risk is that project-facilitated health services do not reach vulnerable groups in border areas. This risk will need to be mitigated through participatory planning, mainstreaming outreach in annual operational plans and budgets, and logistic and technical support. Other project risks are limited financial management and procurement capacities for external aid in MOH Myanmar. The proposed PMU will need to build up MOH capacity in these areas.

I. INTRODUCTION

a. Purpose of Analysis

1. Under the Greater Mekong Subregion (GMS) economic development program, the Governments of Cambodia, Laos, Myanmar and Viet Nam are considering support from the Asian Development Bank (ADB) for a GMS Health Security Project (the project). The purpose is to strengthen national health security systems and regional cooperation for the prevention and control of emerging infectious diseases (EIDs) and other diseases of regional importance in the GMS, and help countries comply with the International Health Regulations (IHR) 2005 and implement the Asian Pacific Strategy for Emerging Diseases (APSED) of the World Health Organization.¹ ADB has been supporting various health projects for communicable diseases control (CDC), HIV, malaria, and related regional technical assistance in the GMS.²

2. The proposed regional project goal is to strengthen GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities, (ii) outbreaks have less than 0.5% impact on gross domestic product (GDP) in any quarter of the year, and (iii) increased use of public health services in border areas by MEVs. The proposed regional project outcomes are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed regional project outputs are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed project targets 13 provinces in Cambodia along the borders and economic corridors with Lao, Thailand and Viet Nam. Total project costs for Myanmar from 2017 to 2022 are estimated at \$14.9 million.

3. The consultant undertook a health sector analysis for the proposed GMS Health Security Project for Cambodia, Lao PDR, Myanmar and Viet Nam. The purpose was to examine relevance of the proposed scope, and identify project priorities and risks in Myanmar. This report includes (i) a general sector review to identify health system constraints, in appendix 1, (ii) a specific review of public health security progress and gaps in the main text, with an appraisal questionnaire in appendix 2, and (iii) a proposed project outline, implementation arrangements, safeguards and risks. The GMS problem tree and results framework are respectively in appendices 3 and 4.

b. Global Health Threats

4. Myanmar is highly vulnerable to the spread of EIDs and other diseases of regional importance such as HIV, TB, malaria, and dengue as there are favorable conditions for the spread of infections due to open borders and increasing connectivity; isolated populations in conflict zones, labor camps, border areas and remote locations; and lack of treatment and control capacity.

¹ World Health Organization. International Health Regulations. 2005; Asia Pacific Strategy for Emerging Diseases. 2010.

² Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

5. After the SARS outbreak in 2003 and avian influenza outbreak in 2004, several other outbreaks of EIDs occurred in the GMS, most of which were identified and controlled at an early stage, thanks to a functioning surveillance and response system and cooperation among sectors. MOH has also benefited from support of different development partners including WHO, US CDC, and ADB to strengthen its surveillance and response system. While core functions for IHR are in place, there are gaps that need to be addressed to optimize public health security and address health system response constraints.

6. Over 1,200 cases and 400 deaths due to MERS-CoV have been reported in 20 countries, including most recently in Korea. More than 14,000 Ebola hemorrhagic fever (EHF) deaths have been reported among 28,000 cases in the West Africa outbreak. WHO has announced a state of emergency on the Ebola virus worldwide. Several dangerous strains of influenza A circulate in the region including H7N9, H5N6, H5N1, and H1N1. Myanmar lacks capacity for diagnoses of most EIDs. The large number of unconfirmed cases suggest a need to improve the surveillance system.

7. EIDs like SARS and MERS have the potential to spread quickly around the globe, with relatively large economic, and sometimes devastating human impact. Other infectious diseases carry the potential of causing new epidemics due to changing pathogens, risk factors, and drug resistance. Drug resistance is potentially one of the most threatening emerging problem to deal with common bacterial infections, STDs, HIV, malaria, tuberculosis, and nosocomial infections. Hence, Myanmar has to become more resilient and secure to the threat of EIDs and other diseases of global importance, including drug resistance.

8. Common infections constitute the major burden of diseases in children and young adult, in particular among the poor. Four new vaccines have been introduced free-of-charge, namely hepatitis B vaccine for all newborns and Japanese encephalitis B vaccine, typhoid vaccine, and cholera vaccine for endemic areas. Rubella-measles vaccination campaigns have targeted children aged 9 months to 14 years. Vaccination against 3 other common and dangerous bacterial infections and rotavirus are not yet included due to lack of funds.

9. The country also continues to battle other infectious diseases of global concern like HIV/AIDS, tuberculosis, malaria, dengue, food- and water-borne diseases, and zoonosis. Cholera has re-appeared, related to living conditions and labor-related risks. In addition, major east-west and north-south economic corridors transect the country. From 2013 to 2015, tourism tripled to about 450,000 tourists per month in addition to a sharp increase in business travel, mobile people and migrants.

c. Public Health Security

10. The term “public health security”, or sometimes called “public health resilience” became popular after formulation of IHR 2005, in view of the threat of EIDs. WHO, in the World Health Report 2007, coined it as *a set of activities, proactive and retroactive, to minimize vulnerability to acute public health events that endanger the collective health of populations*. Public health security is complementary to individual health security. They are closely intertwined,³ and both contribute to achieving universal health coverage (UHC), which is affordable quality health care for all, as one of the sustainable development goal by 2030.

³ The term “health resilience” was used in the opening speech of the May 2015 WHO Health Assembly. Public health security may be understood in a narrow sense as the capacity to avoid and contain epidemics. In the wider context, health security may also concern man-made chemical and radiological threats, natural disasters and perhaps also epidemics like obesity and road traffic accidents.

11. The term public health security may be more narrowly used for taking measures to reduce the threat of EIDs such as avian influenza, SARS, MERS and EHF. However, in the broader context it also concerns the (potential) spread of other infections in and across populations, such as cholera, dengue, zika and HFMD (hand, foot and mouth disease) in the GMS. The spread of diseases through drug resistance, including HIV, bacterial infections, malaria and tuberculosis also constitute real regional and global threats, and requires high priority.

12. Health security includes (i) measures to avoid emergence of diseases (biosafety, immunity, safer drugs), and (ii) measures to interrupt disease transmission (hygiene, vaccination, isolation, treatment). While the usual focus is on interrupting transmission, in view of declining public exposure to pathogens and increasing drug resistance, more attention should be given to avoiding the emergence of new diseases, e.g. by controlling the sale of antibiotics and improving nutrition status.

13. Health security depends on strong government commitment, given the public good nature, and depends on all chains in a health security system, as reflected in APSED, to be in place. Second, health security depends on core capacity of a basic health system (sometimes this is not given attention in APSED assessments). Within the health sector, this includes leadership, communication, adequate financing, logistics, and private sector participation; and, outside the health sector, local government capacity. Third, health security depends on community participation in prevention and reporting suspected cases. For example, the EHF outbreak in West Africa was largely controlled through community action including social distancing, assistance in contact tracing, and sanitary measures. Communities not connected to health services, often located in border areas and with a higher burden of communicable diseases, are of major concern. Fourth, health security also depends on security in neighboring countries, and in regional and cross-border cooperation. In 5 years, all GMS countries, as part of ASEAN, should develop adequate surveillance and response systems, and in 15 years all countries should achieve adequate infection prevention and control (IPC) based on WHO standards.

14. Accordingly, the scope of a health security project is not simply filling IHR/APSED gaps, although this is a major part. It also concerns improving access of high risk groups to the health system to support control of EIDs, and strengthening relevant parts of the health system. While these strategic areas may be addressed through other sector developments, specific gaps that affect health security need to be identified and addressed. Regular APSED monitoring therefore should incorporate health system assessment relevant to health security and be linked to sector-wide remedial actions. Lastly, governments, regional networks and partners need to come together in an integrated program approach, as this may otherwise lead to fragmentation and duplication, and increase the likelihood of outbreaks. Program coordination in rolling out IHR/APSED also needs to be monitored.

15. Government intervention in health security and CDC is justified on the basis of public goods and externalities, market failure, and equity issues with high benefit cost ratios. EIDs, the spread of other infections of regional relevance, and drug resistance also constitute national and global security concerns in terms of potential for major human disaster and economic meltdown, requiring government intervention. However, that does not imply that the government should provide these services, but should consider other ways, including regulation and contracting out, given government's operational constraints, and encourage private sector participation. While there is increasing pressure to shift government funds to NCDs, the age-specific burden of

diseases shows communicable diseases kill far more children than NCDs, in particular the poor.

16. Myanmar is committed to fulfill its obligation to build up core capacity in the fight against EIDs and other public health events under the International Health Regulation (IHR 2005).⁵ Myanmar participates in the implementation of the WHO-led APSED. The country is progressing but not yet in compliance with IHR requirements, which are due by 2016. Hence, the government is committed and pressed to take the final steps in bringing the country up to international standards for public health security.

d. Country Context

17. Myanmar is the largest country in Southeast Asia, with 676,000 square kilometer, larger than France. The country mainly has a tropical climate, with the southwest monsoon bringing heavy rains in summer. The country shares borders with Bangladesh for 193 km, China 2,185 km, India 1,463 km, Laos 235 km, and Thailand 1,800 km, and has a coastline of 2,832 km. The country is rich in natural resources including petroleum and hydropower and about 30% of the forest cover is remaining. About 15% of the land is used for agriculture, including some irrigated lands.

18. The Burmese, comprising 68% of the population, mostly reside in the central lowland, including a dry zone, irrigated plains, and the Ayeyarwady river delta in the south, the setting of the 2008 Nargis typhoon. The surrounding mountains and plateaus in the west, north, east and southeast are predominantly inhabited by ethnic minorities such as Shan, Karen, Rachine, Kachin, and Mon. There are over 135 ethnic subgroups and over 100 language and dialects in Myanmar. Buddhism principles exert a strong influence over administration, lifestyle, and social life, including for charity and organization of health services, and for health seeking behavior.

19. The country's population is about 54.4 million⁶ and growing at 0.7% per annum.⁷ The population density is average at 83 persons per square kilometer. With an average age of 28.5 years, 30% of the population is below 15 years and 9% is over 60 years. About 34% of the population lives in urban areas, which are growing at a rate of 2.5% per year (World Bank). Life expectancy has reached 67 years and with a narrow base of the population pyramid, the population is aging rapidly and the dependency ratio will increase. However, political, economic, and social reforms may result in an increased total fertility rate. The m/f sex ratio is 1.06.

20. The country is divided into 15 administrative regions, including the capital region, 7 regions, and 7 states.⁸ In 2015, there were approximately 69 districts, 330 townships, 82 sub-townships, 396 towns, 3,045 wards, 13,267 village tracts and 67,285 villages.

⁵ WHO International Health Regulations 2005 Second Edition. The IHR (2005) is a legally binding document for all member states of the WHO. The purpose and scope of IHR are to “*prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade*”. Cambodia has also actively participated in different activities at national, regional and global levels leading to the adoption of the IHR (2005).

⁶ These are estimates. Government estimates are higher in view of underreported rural births and deaths.

⁷ The Government promotes birth spacing of at least 3 years. As per MICS 2010, the most common form of contraception is injectable, a high 60%, followed by oral contraceptives, at 15%.

⁸ Including the Nay Pyi Taw Union Territory; Ayeyarwady, Bago, Magway, Mandalay, Sagaing, Tanintharyi, and Yangon regions; and Chin, Kachin, Kayah, Kayin, Mon, Rakhine and Shan states.

21. Myanmar is surrounded by large economies and populations, including China in the north, India and Bangladesh in the west, and Thailand in the east, and in proximity of other major commercial and industrial hubs. The Myanmar economy, with the help of its regional partners, was only partly affected by western economic sanctions. Economic growth was more affected by state monopoly with market restrictions. Adaptation of a less restrictive and controlled market economy, and improved, the business environment has led to high economic growth despite transitional challenges. Per capita income has doubled in the last decade. It is expected to grow at 7.8% between 2015 and 2019.⁹ Annual per capita income reached \$880 in 2010 and an estimated \$1,600 in 2015, at a PPP of \$3,300, and is expected to grow to \$5,000 by 2030. Myanmar is expected to industrialize further and qualify as a middle income country by 2020.

22. Overall, poverty has declined from 32% in 2004/5 to 26% in 2009/10 according to the Integrated Household Living Assessment surveys 2005 and 2010 jointly conducted by UNDP and MNPED. The poverty reduction target for 2015 is 16%¹⁰. Most of the remaining poor live in rural areas, including ethnic groups in mountain districts, and depend on agriculture as a livelihood. Poverty levels are twice as high in rural compared to urban areas (29% and 15%, respectively). Poverty rates have dropped faster in urban areas and lower among ethnic groups. In addition to landlessness and unemployment, natural disasters trigger lasting poverty as families become persistently indebted.

23. Since typhoon Nargis and the economic adjustments, the number of international and local NGOs has increased. About 60 international NGOs work in the health sector, compared to a reported 27 in 2002. International aid has also increased, including from the 3DF¹¹; Global Fund to Fight HIV/AIDS, tuberculosis and malaria; bilateral sources, and philanthropic organizations. Many of these initially focused on assistance of Nargis victims. With the government easing up, an increasing number of agencies and NGOs also target poor ethnic groups, including in what are still considered special areas. This is a very encouraging development that opens opportunities to address critical gaps in communicable diseases control in the GMS.

24. A new constitution was adopted in 2008 and a civilian government was put in place in 2012, drawn largely from the military. Even so, after 50 years of military rule, this new government has managed a largely peaceful and very rapid transition based on a series of political, socio-economic, administrative and employment reforms.¹² The country opened up to broader foreign investments and market development, and embarked on a process of national development. Laws that denied freedom of speech, association, and movement have been for the most part suspended or revoked. Almost all of political prisoners have been released and political

⁹ Economic Outlook for Southeast Asia, China and India 2015: Strengthening Institutional Capacity, <http://dx.doi.org/10.1787/saao-2015-en>.

¹⁰ Policies for Growth and Development in Myanmar. Daw Win Myint, Dep DG Planning Department.

¹¹ The 3DF set up in 2006 by Australia, Denmark, the European Union, the Netherlands, Norway, Sweden and the United Kingdom and managed by UNOPS helps Myanmar achieve MDGs for HIV, malaria and tuberculosis. The second phase, 2012-2016, also includes maternal, neonatal, and child care and long term sustainability.

¹² President Thwin Sein, in 2014, opening a two-day forum organized by the Ministry of National Planning and Economic Development, invited all development partners to closely cooperate with the government under the Nay Pyi Taw Accord for social and economic development of Myanmar. Commenting on the five-year development plan and Myanmar's comprehensive development plan, he recalled that in the past 30 months, the government has undertaken four phases of reforms. The first phase aimed at creating favorable conditions for national reconciliation with ethnic minority groups. The second phase achieved good socio-economic development. The third phase is to reduce central control and improve administrative capacity of local governments. The fourth phase is to improve governance in the economy and infrastructure, and implement projects that directly benefit people and creates jobs, e.g., in electricity, agriculture, water supply, financial services, and tourism. The government's interim plan 2012-2015 gives top priority to agriculture which employs some 52% of the workforce.

exiles have begun to return. Based on UNDP's human development index, Myanmar ranked 150 out of 187 countries in 2014.

25. Myanmar has considerable potential and strengths, in terms of its strong organizational heritage, a relatively well educated labor force, ample natural resources, strategic location, large working age population, low population growth, entrepreneurship, and people's resilience as evidenced in the community midwives rebuilding the destroyed health centers after typhoon Nargis in 2008. Myanmar has a potential to rebuild its strong administrative system backed by competent teaching institutions. The share of formal employment has also increased to around 60%.

26. Myanmar is also facing major challenges. As much as one third of the country – 10% of the population – may be less accessible. One third of the population lives in poverty. About one million internal migrants work in services, industries, plantations and mines, in particular coming from the northern regions to work in the southern states, while about half a million migrants, mostly from the south, work abroad because of better language skills and higher education level. About half a million refugees are also living abroad, mostly in Thailand, but also in China, to escape conflict, exploitation, poverty, or lack of social services. While those employed send remittances, this also constitutes a considerable brain drain of skilled people. The country is also prone to various types of natural disasters. Myanmar's business practices and economic dependency with neighboring countries developed during sanctions may be less favorable in the longer term. And lastly, lack of transparency and data causes uncertainties and inefficiencies.

27. Myanmar is implementing the National Comprehensive Development Plan (2011-2031) to accelerate growth, achieve equitable and balanced development, and reduce socio-economic development gap between rural and urban areas. The Plan prioritizes industrial development; balanced rural-urban development; improvement in education, health and living standard; and improving statistical capacities. It needs to adjust its institutional capacity, speed up government processes including judiciary processes, and develop an educated workforce and services. The government has identified 24 special development regions and upgraded towns and villages to improve infrastructure and services. The government has given top priority to agriculture which employs some 70% of the workforce, including in plantations.

28. If Myanmar can manage this complex transition well, it will become financially self-sustaining in the foreseeable future. The current surge of commercial investment will help strengthen the economy, and inflow of ODA will help provide bridge financing and technology transfer to recover from years of underinvestment in infrastructure, industry, agriculture, services and people, and to transform the country to become a modern industrialized, globally connected, country along with its neighbors in Southeast Asia.

II. PUBLIC HEALTH SECURITY PROGRAM

a. The Challenge

29. Myanmar has had some exposure to EIDs, in particular avian influenza. Recently, it quarantined one suspected case of EHF and four fellow travelers at Yangon airport, but test results were negative for Ebola virus. However, giving its long and complicated borders, it will be hard to identify suspected cases in border areas, even at multiple points of entry. In fact, the mountainous borders of Myanmar are probably high risk areas for transmission of communicable diseases because they are relatively on their own engaged in local business.

30. Given the incubation period of EIDs, the most likely place where patients with EIDs are identified is in hospitals, as patients who get sick will seek hospital admission. Hence, hospitals are likely to be the most likely place to identify cases. Hospitals in Myanmar, after years of underfunding, are not in a good state to handle highly infectious cases, and are likely to become a source of the spread of an EID, as was the case with MERS in South Korea. Also given that the surge capacity for any outbreak is close to zero, as it is even in developed countries, prevention, early reporting, and timely and appropriate response are essential to avoid major epidemics.

31. While Myanmar has done relatively well in terms of MDGs, with mainly remote communities lagging in health indicators, Myanmar still has a very high burden of communicable diseases, including HIV, tuberculosis, malaria and dengue that are diseases of regional importance. Dramatic improvements in health MDGs and reduction in burden of infectious diseases was achieved despite a well organized but seriously under resourced health system. It is evident that resources for health need to be improved to strengthen health systems and improve population coverage to help achieve universal health coverage and provide the basis for regional public health security.

b. Organization and Plan

32. In 2013, the National Disaster Management Law was enacted to endorse the role of the multi-sectoral National Disaster Preparedness Central Committee coordinated by the Ministry of Social Welfare, Relief and Resettlement, with a National Disaster Management Working Committee and Subcommittees including for health.¹³ It is not clear how this committee relates to the implementation of IHR but the assumption is that it will cover any disaster, including epidemics and chemical or nuclear accidents, beyond the scope and capacity of MOH.

33. During major epidemics and other major public health events, a broad multi-sectoral support is essential including maintaining law and order, setting up treatment centers, logistics, management of essential services such as water and electricity, community tracing of infected cases, hygienic burials, public information for social distancing and other measures, and international relief coordination. The EHF outbreak in West Africa demonstrates the complexity of epidemic response.

34. MOH has a Central Epidemic Unit (CEU) in the Department of Public Health (DPH) responsible for surveillance and response (but not health information system), including managing the reporting and investigation of notifiable and other epidemic prone communicable diseases, risk analysis, community preparedness, and outbreak control. This unit also manages disease prevention and emergency health services following disasters such as following typhoons, floods and droughts. The National Health Laboratory, Mandalay and Nay Pyi Taw regional laboratories, and state/region laboratories under the Department of Medical Services work closely with the CEU during outbreaks, and so do state/region administrations. The CEU is organized and competent in dealing with outbreaks, the major issue being resource constraints requiring mobilization of various parties.

35. MOH has established an IHR National Focal Point (NFP) in CEU under DPH, and focal points at state/region and district levels. Quarantine officers are also available at major international airports, ports and land crossings.

¹³ Asia Pacific Observatory on Health Systems and Policy. Health Systems in Transition Volume 4, Number 3. 2014. The Republic of the Union of Myanmar Health Systems Review.

c. IHR/APSED Evaluation

36. **GMS IHR Compliance.** Public health security is as good as its weakest link. Within the GMS, PR China and Thailand have comprehensive national health security systems in place, and seek to further enhance public health security through regional cooperation, cross-border cooperation, and CDC in border areas. A good way to assess performance of the public health security system is by assessing the progress in building core capacities of the IHR 2005 and implementing the strategic areas of APSED (2005, 2010) and other WHO strategies for CDC.¹⁴ IHR core capacities are assessed by countries and WHO using a standard questionnaire of some 350 questions, and cover most APSED strategic areas.

37. Table 1 provides a 2015 assessment of IHR Core capacities in CLMV countries using this standard questionnaire. This is partly based on self-assessment by MOH officers and partly based on assessment by consultants with support of ADB (WHO plans for independent IHR evaluation and APSED monitoring). What is important is to identify core capacities that are lagging behind or making slow progress.

38. The assessment suggests that Cambodia has the worst IHR core capacity, which perhaps reflects a more self-critical assessment of MOH; and Viet Nam the best among CLMV countries, as expected. Viet Nam MOH gives itself a very high score based on the minimum standards checklist, but in an IHR/APSED review meeting in 2015 did present shortcomings in preparedness and response.

39. In 2012, Cambodia, Lao PDR and Viet Nam scored 46%. While IHR compliance is due in 2016, CLMV countries scored 69% on average, implying that two-thirds of IHR requirements are in place, and one third remains to be accomplished. In 2015, the highest scores were for coordination, surveillance and zoonosis, while in 2012 for three countries this was zoonosis, surveillance, and response. The lowest scores were for human resources and chemical and radiological hazards, while in 2013 for three countries this was risk communication, and chemical and radiological hazard.

Table 1: GMS IHR Core Capacities Assessment 2016

Core Capacity	Cambodia	Laos	Myanmar	Viet Nam	Average 2016
Legislation	50	60	60	100	68
Coordination	55	89	94	100	85
Surveillance	80	81	73	88	81
Response	48	58	67	89	66
Preparedness	60*	71	48	95	69
Risk communication	42	62	40	100	61
Human resources	40*	44	43	100	57
Laboratory	40	78	77	100	74
Ports of entry	76	61	56	100	73
Zoonosis	78	69	92	100	85
Food safety	67	80	46	100	73
Chemical	30*	41	39	88	50
Radiological	30*	47	47	100	56
Total score	53	66	60	96	69

¹⁴ Including bi-regional strategies for HIV/AIDS, malaria, tuberculosis, dengue, laboratory, and health financing.

Source: consultant appraisal based on WHO documentation, MOH interviews and field observations using IHR Questionnaire. *Expert estimate only.

40. While there are substantial country-to-country variations, progress may be summarized as follows: (i) all CLMV countries have surveillance and outbreak response systems for notifiable diseases and any other outbreak, but want to deepen this to include syndromic reporting from village level upward, initiate reporting from the private sector, and improve data management; (ii) laboratory services have been expanded but need better quality, biosafety, standards, and supplies; (iii) cooperation for control of zoonosis (“one health”) is reportedly good; (iv) infection prevention control (IPC), for which WHO has formulated a regional program, has received less attention and funding and much remains to be done to improve hospital hygiene and infectious case management; (v) risk communications have improved, in particular linked to emergencies; (vi) pandemic preparedness remains limited, with no surge capacity in case of major outbreaks¹⁵; (vii) regional preparedness, alert, and response (including information exchange) is also inadequate, amongst others due to political sensitivities, and (viii) APSED monitoring needs to be strengthened further, possibly with independent evaluation of progress. WHO has estimated financing gaps in implementing APSED, which are substantial, in particular for laboratory services, emergency capacity and, for unknown reasons the costliest, for community preparedness.

41. In summary, IHR/APSED areas under direct control of CDC/public health departments have improved most, reaching about 80% compliance, while areas involving other countries, ministries, community and departments have done less well, including laboratories and hospitals, community level, and intersectoral and inter-country cooperation. Also marginal communities not accessing health services, in particular ethnic minorities in border areas and migrants in economic zones need to be engaged in EID preparedness and CDC. GMS strategic planning for CDC also needs to be enhanced. IHR capacity building and roll out of APSED strategic areas face a range of challenges as summarized in the next paragraphs. Details are on the countries health analyses.

42. The IHR 2005 of WHO provide a strong and legally binding standard for the control of EIDs and other serious public health threats, such as the spread of drug resistant infections.¹⁶ WHO’s APSED¹⁷ and other WHO regional strategies for disease control and health system development provide a good framework for building GMS health security and major progress has been made. The CLMV governments are fully committed to comply with IHR, and made major progress in implementing APSED. While IHR compliance is due by 2016, CLMV countries have so far achieved about 70% of requirements.¹⁸ With support of the Global Fund to fight AIDS, malaria and tuberculosis, they have also surpassed MDG6 for the control of infectious diseases and substantially reduced the prevalence of these major debilitating and often fatal diseases.

43. GMS countries have legislation requiring the public to report cases of suspicious infections. If people with a serious infectious disease like SARS, EHF, rabies or cholera delay seeking help, they can cause death of other people. Precious time will be lost to control a

¹⁵ Even developed countries like Australia lack a major surge capacity, as was clear during the swine flu outbreak. Also international surge capacity response was quickly exhausted with one major EHF outbreak. Hence the focus should be on prevention of major outbreaks.

¹⁶ WHO. 2005. *International Health Regulations*.

¹⁷ WHO WPRO. 2010. *Asia Pacific Strategy for Emerging Diseases*.

¹⁸ WHO. WPRO. 2014. *Asia Pacific Strategy for Emerging Diseases. Progress Report 2014. Securing Regional Health*.

potential outbreak at an extremely high cost. Good health services that have the public confidence are therefore essential to achieve public health security. Hence, governments and partners need to ensure that both public health security systems and universal health coverage are in place.

44. The 13th GMS Joint Ministerial Statement held in Vientiane in 2004 reaffirmed the three C's; Connectivity, Competitiveness, Community, of the GMS region. The GMS summit emphasized quicker results on the ground to rapidly reduce poverty; acknowledged the need for even higher level of collaboration; emphasized the role of private sector and development partners; noted that spread of communicable diseases is being addressed through coordinated regional response; noted the important role of regional institutions in capacity building; and agreed on a Plan of Action for GMS Program, including HRD sector.

45. The GMS HRD Working Group, identified three objectives for the GMS Health Strategy: (i) strengthened institutional capacity and arrangements for GMS cooperation in health; (ii) enhanced national and provincial CDC collaboration and health care in border areas; and (iii) strengthened regional integration through collaboration for HRD, strengthened regional knowledge management and COP, and regional standard setting.

46. **Myanmar IHR Performance.** In 2012 and 2014, MOH requested for 2-year extension to meet IHR core capacities. A review of the 13 IHR core capacities (a total of 260 fields to be assessed) arrived at a total score of 60% on average, which is quite low for the GMS. However, it should be kept in mind that this is an assessment based on incomplete information. Each core capacity is also an average. For example, the total score for response capacity is quite low at 67%, as this score includes IPC in hospitals, in addition to emergency response capacity. Top performing core capacities were coordination and zoonosis. Least performing core capacities, according to the consultants, were chemical emergencies and public communication. Another concern is time trends, as in some areas there has been less improvement over the years. But because questionnaires keep changing, it is difficult to observe trends. The message is quite clear, in that MOH needs to strengthen the surveillance and response system led by CEU to address the various outstanding issues of IHR, starting with SOPs for all IHR aspects, mobility, and training. Given many other competing needs for legislation in MOH, improving legislation for IHR will take time and would justify financing WHO to provide additional technical assistance.

Table 2 – Assessment of IHR Core Capacities 2015

No.	Core capacity	Fields	Accomplished	%
1	Legislation	5	3	60
2	Coordination	18	17	94
3	Surveillance	30	22	73
4	Response	27	18	67
5	Preparedness	21	10	48
6	Communication	10	4	40
7	Resources	7	3	43
8	Laboratory	22	17	77
9	Points of Entry	48	27	56

10	Zoonosis	13	12	92
11	Food safety	24	11	46
12	Chemicals	18	7	39
13	Radiological	17	8	47
	Total score			60

Source: consultant appraisal based on WHO documentation, MOH interviews and field observations

47. Other priority areas that need attention are the expansion of the surveillance system to the community level, strengthening IPC in hospitals, improving hospital and general preparedness for major outbreaks, public information campaigns, substantial increase in staff resources (training already underway but underfunded), capacity building of ports of entry, and improving emergency diagnostic capacity and containment for poisonous foods, and chemical and radiological incidents. Appendix 2 provides the 260 questions and initial responses, that are currently being reassessed with support of a WHO team.

d. Surveillance and Response

48. The national surveillance system focuses on the surveillance of the epidemic prone communicable diseases (severe diarrhea, cholera, dengue hemorrhagic fever and plague), 17 Diseases Under National Surveillance (DUNS) (including diarrhea, dysentery, food poisoning, typhoid and paratyphoid), EIDs, post disaster and climate-related communicable diseases, vaccine preventable diseases, and early warning, alert and response system (EWARS). Private sector routine reporting of CDs needs strengthening, although some in the private sector are actively participating in CD prevention and control programs and collaborative effort is seen between CEU and private hospitals.

49. The WHO-supported and centrally and regionally managed national surveillance system is operational nationwide up to commune level, providing reporting of notifiable diseases within 24 hours and in more accessible part of the country outbreak response within 48 hours. It uses multiple channels for reporting of both suspected and confirmed cases and outbreaks. Much of the commune reporting is still done manually, although mobile phone coverage is high. Usually, reports of cases or suspected outbreaks are entered into the system at district or regional level. Reliability and maintenance of computer services at district level is still not satisfactory, internet connection is slow, and web connectivity poor in most locations. While the intention is to expand the web-based reporting system to commune level, major outbreaks or disasters can disrupt this service, and a back-up reporting system will need to be maintained. Each region has a trained field epidemiologist (FETP), and most districts have a staff trained in applied field epidemiology. Health center staff have also been provided orientation. However, the completeness and accuracy of information need further improvement. In addition to training, a system of surveillance quality assurance may need to be applied.

50. The surveillance and reporting systems for various programs will need to be further linked to the general Health Information System (HIS), for which a new software is being piloted based on the University of Oslo developed district health information system. The main shortcomings at present are information technology and data entry staff, training, and computers, items which the project may support. Web connectivity, staff availability and training needs, and availability of equipment need to be further assessed and standards and criteria

need to be developed for expansion of web-based reporting. There may also be a need to support the field epidemiology training program.

51. Vehicles for outbreak response are available in all regions and perhaps 20% of districts, but many of these vehicles are old. Vehicles are essential in rural districts, as without these, remote populations cannot be accessed conveniently. A survey of vehicles is required, and selection criteria for the provision of vehicles need to be developed. PPE is mostly available in small numbers at regional level, and equally needs replacement. Other equipment and supplies for outbreak response also need to be assessed.

52. Outbreak investigation funds should be standby for each district, but this is not the case resulting in delay in investigation of outbreaks. If health staff pay travel out of pocket, reimbursement may take a long time. Also, investigation funds for suspected outbreaks cannot be used in a flexible manner such as for conducting simulation exercises or public preparedness campaigns. WHO also provide funds for outbreaks but usually based on repayment of expenditures, which is not a satisfactory arrangement for emergencies.

53. Strategic areas of APSED closely related to surveillance and response are risk assessment, risk communication, "one health" coordination with animal health services, regional and cross-border cooperation, community preparedness and APSED monitoring supported by WHO. These areas are critical to early warning and timely response. With the exception of community preparedness, supporting these activities requires modest funding. Community preparedness is typically done through grassroots organizations that need to be strengthened and supported. This can often be combined with other disaster preparedness such as for floods. Various international partners and NGOs like the Red Cross are active in this field. Each of these areas needs further assessment base on the latest APSED evaluation.

54. In line with ASEAN and IHR/APSED requirements, the government is aiming to strengthen preparedness and response for EID and other communicable diseases. Priorities are improving surveillance and response in border areas, cooperation with animal health for detection of zoonosis, regional information exchange, improving preparedness, and improving checkpoints and quarantine services at point of entry. There are less than 100 official points of entry, but many more unofficial border crossings by local people. Free information and reporting hotlines may or may not be available.

55. MOH has identified 4 quarantine levels, with the highest level being full quarantine services at three designated hospitals. Regional hospitals also have lower level quarantine facilities to isolate suspected patients for further investigation. For major outbreak, there are plans to establish field hospitals and contain people's movement with support of the army.

56. Public or community preparedness for symptoms of EIDs and other major and fast spreading infectious diseases such as cholera and dengue is a multi-sectoral responsibility. While Myanmar has national preparedness plans in place, these are insufficiently known and shared at township level. NGOs have been active in public education campaigns following avian flu epidemics but this effort is not being maintained for a broad range of EIDs. Hotlines managed by CEU will help improve event based reporting as most communities now have access to the telephone network. However, there is probably a need to improve public preparedness in terms of how to handle suspected patients or outbreaks, in particular among at risk populations such as isolated ethnic groups in border areas and migrant workers from other countries. This needs to be assessed further by the DPH.

e. CDC in Border Areas

57. Border areas in Myanmar are a major challenge for public health security. They are mountainous, have ethnic groups that speak other languages, have large numbers of mobile people and migrant workers, have less penetration of services, have security problems, and services provided in these areas are fragmented and not coordinated by the state/region health office. Within the GMS, the border areas of Myanmar are probably a major risk area for epidemics going unnoticed for some time. Hence, in addition to improving general surveillance and response and ports of entry, a strong case can be made for targeted border areas. Currently, event-based reporting from village level is very low, and indicator-based reporting will require cooperation of nongovernmental services. However, given the current information gap, this is probably a high priority. This can only be done with support of local communities, community representatives, and various formal authorities. Public health security in border areas requires collaboration with various ministries and a range of other stakeholders and justifies a special program, which may also attract international aid.

58. A second reason for targeting border areas is a relatively high burden of communicable diseases including HIV, tuberculosis and malaria due to often unhygienic conditions in villages and trade centers, and large number of migrants working in plantations, industries and services. While the burden of HIV is higher in cities where there is access to medicine, getting HIV infected probably occurs in settings with drugs and multiple partners, conditions typically observed in ethnic villages and industrial zones in border areas.

59. Posting field epidemiologists at state level and assistant field epidemiologists at district level or in large townships will build up much needed capacity for CDC in border areas. This needs to be accompanied with outreach and increased capacity of laboratories to diagnose and hospitals to provide treatment. A longer term approach focusing on disease prevention is the model healthy village development which has been used successful in neighboring countries.

f. Laboratory Services

60. The bi-regional Strategy of Strengthening Laboratory Services and National Health Laboratory Policy and Plan of SEARO and WPRO provide an excellent generic guide to assessing and planning overall national laboratory services. Key features for laboratory services are laboratory planning, and financing, laboratory management, laboratory facilities, equipment, human resources, procurement and supply management, laboratory equipment management, quality improvement and assurance, and safety and waste management.

61. The National Comprehensive Development Plan (Health Sector) (2011-2031), Health Plan and Annual Health in Myanmar report 2014 have surprisingly little information about laboratory services. In the NCDP, laboratory services are grouped under the Curative Services Program, while it would also have to contribute to the Disease Control Program, and the Public Health Program including drug resistance and food safety. However, these other programs, or even specific disease control programs, have their own laboratories. It appears to be a very vertical organization.

62. Public medical laboratory services in Myanmar are essential in early and reliable diagnosis and treatment; investigating outbreaks of disease; disease surveillance; monitoring the quality of water and food; and, unique to Myanmar, monitoring the various vertical national health programs. The country has established a nationwide network of laboratory services network to ensure proper diagnosis, referral, coordination, monitoring, and training. Plans are to

provide all rural health centers type D minilabs with microscopy and some basic tests. New Clinical Pathology and Public Health Laboratories are to be established in township, station hospital and remote border areas, and referral laboratories are to be upgraded. It is not clear whether clinical and public health laboratories will be combined. This contrasts with global trends, whereby, with improved communications, laboratory services are centralized.

63. Concerning procurement and quality control of supplies and procurement and maintenance of equipment, the Central Medical Stores Department is responsible for procurement, storage and distribution of medical supplies for all hospitals, health centers, MNCH, donations from partners, and repair and maintenance of equipment. A computerized inventory control system and local network has been set up.

64. The National Health Laboratory in Yangon is the referral and quality control laboratory for infectious diseases control and curative services. There are plans to set up a similar laboratory in Nay Pyi Taw and upgrade Mandalay laboratory. The food laboratory in Yangon is responsible for quality and safety of products. The drug laboratory in Nay Pyi Taw is responsible for quality assessment and efficacy of all imported drugs including post marketing sampling, and testing of medical devices and cosmetics. The Mandalay laboratory also tests food and drugs. Regional laboratories also provide quality control and testing of drug resistance for district laboratories and minilabs in townships and border points (Muse, Myawaddy, Tachilake, Tamu, Kawthaung, Myeik, and Chin Shwe Haw border trade zones).

65. With increasing health sector financing, MOH has put a considerable amount of funds to replacing outdated laboratory equipment, some of it antique and precious. It is not clear what is the equipment situation in subnational laboratories, but apparently these have also been supplied with equipment recently. The big challenge now seems to be to provide the software support for operating the equipment, and setting standards for management, equipment maintenance and calibration, and tests. It may also be necessary to roll out a program for renovation and replacement of old laboratories, in particular also in view of biosafety. Laboratory staff is likely to be short in the states. The situation on laboratory financing and supplies is to be investigated. There are also issues of access and integration of laboratory services. To bring all laboratory services together in one department may be considered when updating the national health policy 1993.

g. Hospital Infection Prevention and Control

66. As in the case of MERS, health facilities are often the first place where an EID is recognized, and often a source of spread of the disease, putting patients, health staff, relatives and the world at risk. Hospital and clinic staff are exposed to microorganisms and may contribute to the spread of drug resistance. Life threatening infections and re-emerging infectious diseases like EHF, SARS, AI, multi-drug resistant tuberculosis, and dengue have highlighted the need for efficient infection control program in all health care settings.

67. The World Alliance for Patient Safety was launched in October 2004 to facilitate the development of patient safety policy and practice in all WHO member states and to act as a major force for improvement. In October 2005, the Alliance launched the first Global Patient Safety Challenge with the theme 'Clean Care is Safer Care', to bring together the WHO Guidelines on hand hygiene in healthcare with ongoing work on blood safety, injection and immunization safety, safer clinical practices, and safe water, sanitation and healthcare waste management. It emphasizes that hand hygiene is the primary measure to reduce healthcare-

associated infection, which is a major area of concern in patient safety, and the spread of antimicrobial resistance.¹⁹

68. In a recent attempt to show the scope of the problem of patient safety, Mugrditchian and Khanum (2006) showed that Thai and Indonesian situations are similar to those in industrialized nations where it has been estimated that 10% of hospitalized patients suffer an adverse event and 5–10% acquire a healthcare associated infection.²⁰ They cautioned that the Thai and Indonesian findings should not be extrapolated to other countries in the region. They observed that the incidence of adverse events is likely to be significantly higher in hospitals and in countries where services and accreditation programs are less well developed. They showed evidences that when compared to industrialized countries, the risk of acquiring a healthcare associated infection is estimated to be 5–20 times higher in developing countries and 3–20 times higher for neonates.

69. In Myanmar hospitals. resources for effective infection control such as staff, patient and visitor education; facilities and utilities; and equipment such as coolers, autoclaves and sterilizers have been insufficient for many years. Hygiene practices, strongly culturally embedded, varies. The level of hospital acquired infections and drug resistance in Myanmar is not known, but given current practices and lack of control of the medicine market is likely to be substantial.

70. In case of suspected EID cases, as happened in 2015 with a suspected Ebola virus infection, Myanmar has some quarantine capacity but no surge capacity to speak of.²¹ Myanmar has special isolation wards in its regional hospitals, but these are often old and not suitable for quarantine. Safety features, PPE and special equipment are generally lacking. The main purpose using those wards would be to try to isolate suspected cases for further investigation. Transport of suspected cases has been arranged and simulation exercises are being conducted yearly.

71. Following the Private Medical Facilities act promulgated in 2007, licensing has been provided to 151 private hospitals and 521 specialist clinics. These hospitals and clinics are being inspected and also participate in the voluntary quality improvement programs of the Medical Action Myanmar. Further standardization of registration and licensing of health professionals, accreditation of facilities, customer complaint mechanisms, and other arrangements need to be put in place, including measures for containing infection control and drug resistance. The public-private partnership in the national TB program serves as a promising example.

72. MOH is implementing IPC – infection prevention and control (WHO), in a phased manner based on APSED/IHR, to control general infections, EIDs, and nosocomial infections. A strategy has been prepared to roll out IPC. Standards and guidelines have been prepared. The initial target was national and regional hospitals. The next phase is to improve IPC in district and township hospitals. Each hospital has a designated staff for infection control, but only limited number of people have been provided specialized training. A large number of staff have been given short training in infection control, including case management of EID. This training does

¹⁹ Donaldson, L. (2005). Patient Safety: "Do No Harm", in: Perspectives in Health, The magazine of the Pan American Health Organization. (http://www.paho.org/English/DD/PIN/Number21_last.htm). 2007.

²⁰ Mugrditchian, SD., Khanum, S., 2006. "Placing patient safety at the heart of quality in health care in south-east asia". International Hospital Federation Reference Book 2006/2007 021. <http://www.ihf-fih.org/pdf/21-24.pdf>

²¹ Developed countries also lack surge capacity for a major EID outbreak, and the international community cannot support a global outbreak. This is perhaps the most compelling reason for improving surveillance and IPC.

not extend to case management of other infections, which is managed separately under disease control programs. Under the broad program for strengthening of nursing and midwifery services in Myanmar, one of the projects is to develop guidelines for implementing a system of total quality management in nursing and midwifery services.

73. Other problems include lack of water and sanitation maintenance, waste disposal, and lack of autoclaves and incinerators. Laboratory bacteriology needs to be improved to test for nosocomial infections. Jointly with WHO, an infection control monitoring system is being designed. Accreditation of health facilities will also be subject to meeting infection control standards. IPC needs to be invested in collaboration with WHO. Related areas such as laboratory biosafety and infection control in public places also deserves attention.

74. The situation on medical waste disposal is unknown. Some hospitals have incinerators. There are established procedures for waste management with assistance of WHO. Small equipment and supplies (such as washing machines, containers, plastic liners, protective gloves and detergent), while vital to infection control, may be lacking. Special procedures for medical sharps, contaminated wastes, organic wastes, hazardous chemicals, and radioactive wastes need to be better understood and applied. Recurrent budgetary allocations must be provided to assure the ongoing training of employees, the purchase of supplies, acquisition and maintenance of equipment.

h. Regional Cooperation

75. Myanmar, being mostly excluded from GMS project in the past years, was able to join regional cooperation and control (avian influenza) activities under ADB financed projects such as for piloting malaria control and for CDC related to IHR/APSED.

76. Regional and cross-border cooperation have been important features in GMS projects as these helped to build linkages between ministries, provinces and experts; increased the sharing of knowledge, and in general stimulated improved performance. The regional steering committee, project review workshops, and technical forums all proved very useful indeed. Setting up community of practice (COP) and other knowledge management systems was however hard to sustain as this requires champions who can devote time running these knowledge management activities. Regional and cross-border cooperation was also challenging due to (i) political sensitivities, (ii) lower staff priority, (iii) flow of funds problems, and (iv) complexities of dealing with different systems. ADB's GMS CDC1 and CDC2 projects were able to provide bridge funding through a regional pool mechanisms managed by the regional coordination unit (RCU), but this has been discontinued. Alternative mechanisms for supporting and institutionalizing regional and cross-border cooperation need to be identified, e.g. with technical assistance bridge financing.

77. Regional cooperation has different rationales that need to be analyzed in terms of their merit and burden. Infections easily spread across borders, so exchange of information on suspected cases of notifiable diseases and timely outbreaks control of diseases is important. Some progress has been made in this regard, but progress has been slow due to the need to develop standard operating procedures for information exchange. MOH has made less effort than desired possibly due to sensitivities and other priorities. Other mechanisms for information exchange, such as through WHO and MBDS tend to be too slow to be meaningful for control. In many cases, provinces went ahead arranging local cross-border cooperation, often with support of the local governor.

78. Other reasons for regional cooperation are learning from each other, challenging each other to do better, joint leverage to get support, and economy of scale in working together. Among these, the first two have been important in the GMS CDC context, with numerous exchanges and workshops being held on a wide range of topics, providing exposure to program managers and challenging them to do better. Some of the knowledge management activities have been less effective, such as setting up community of practice. Importantly, future knowledge management activities should be geared towards GMS/ASEAN/APEC standards and development of evidence based strategies.

79. A regional cooperation unit based in MOH, Vientiane, currently provides support to the extended CDC2 project and is likely to continue with support of ADB.

III. MAJOR COMMUNICABLE DISEASES

a. HIV Control

80. According to the National Strategic Plan for the Control of HIV/AIDS (2011-2015) of the National AIDS Program (NAP), revised to include 2016, Myanmar follows the triple one approach of the UNAIDS: one HIV/AIDS Action Framework, one national coordinating authority, one monitoring and evaluation system. To get to the next set of commitments: zero new infections, zero stigma and discrimination, and zero deaths, it needs to be fully funded. However, the Global Fund will phase out its support, and, although the government made an extra \$5 million per year available for anti-retroviral treatment (ART), it cannot absorb ART for all AIDS patients, including those who need treatment but cannot get it so far, plus maintaining the harm reduction and method on program for injection drug users, as well as prevention of mother to child transmission. This also has implications for the spread of the infection.

81. HIV entered the country in 1989 and reached its peak in 1999 with about 32,000 new cases that year. The epidemic started with high prevalence in injecting drug users, followed by other high risk groups including blood donors, female sex workers, military recruits, men having sex with men, followed by clients of sex workers, their wives, and children. At present, about 5,000 new cases are detected each year, without much evidence of further decline, possibly indicating that current strategies or programs need to be reviewed in terms of coverage and appropriateness in reaching hard to reach groups, including migrants.

82. Based on the 2015 Myanmar Global AIDS Response Progress Report (for 2014), overall HIV prevalence was 0.54% in the age group 15 and above. HIV prevalence was estimated as follows: FSWs 6.3%, MSM 6.2%, IDUs 23.1%, compared to FSW 7.1%, MSM 8.9%, and IDUs 18.0%. The report indicates that there may be 212,000 people living with HIV in Myanmar, and that 11,000 died of AIDS in 2014.

83. The NAP objectives are (i) reduction of HIV transmission and vulnerability, particularly among people at highest risk; (ii) improvement of the quality and length of life of people living with HIV (PLHIV) through treatment, care and support; and (iii) mitigation of the social, cultural and economic impacts of the epidemic. Three strategic priorities are: (i) prevention of transmission of HIV through unsafe behaviors in sexual contacts and injecting drug use; (ii) comprehensive continuum of care for people living with HIV; and (iii) mitigation of the impact of HIV on PLHIV, and their families. This reflects a comprehensive and ambitious package of global standard.

84. Behavioral statistics show some worrying indicators. While government data indicates high level of knowledge of HIV and has introduced HIV education in schools, the report indicates that only 47.5% of young people know about HIV/AIDS, and HIV prevalence in this group is 0.7%, higher than in the general adult population, with more exposure to increase further in this cohort. Only 43.8% of adults use condom in high risk sex. Condom use in sex workers was reported at 96%, among the 72% being reached. While 86% of IDU use safe injecting practices, only 23% use condoms. About 40% of all HIV patients (70% of ≤ 340 CD4 count) could access ART. Some may have managed to access treatment abroad. HIV/AIDS program spending reached \$53.5 million, compared to \$39.4 million in 2013, a level which the Government is unlikely to be able to sustain without external aid. Bridge financing ART will continue to be needed in the next 15 years, and more efforts should be made to prevent new infections, through condom promotion, harm reduction and PMCT programs.

85. Studies suggest that a major HIV/AIDS epidemic has less economic and life expectancy impact in low income, labor surplus countries, but can have major impact in more advanced countries. Botswana saw its life expectancy drop by 16 years due to HIV/AIDS almost affecting half of the adult population at its peak. At low prevalence levels, HIV/AIDS causes major suffering and social and financial impact. Benefit cost ratios for preventing HIV/AIDS are therefore among the highest one can find for any intervention.

b. Tuberculosis Control

86. Tuberculosis is a disease that builds up in the population exposed to bad living conditions, such as in war, and if TB programs are not functioning, often as a consequence of these conditions, or simply lack of money. Another characteristic of TB is that the main channel of control is treatment – following passive and active case finding – using DOTS. DOTS regimens have become shorter and more community-based. Even so, a major problem of poor people is to regularly access TB services. Another problem is multidrug resistance. Fortunately, rapid testing for MDRT is now possible, and two new TB drugs have been identified. WHO's global TB control program has now moved from "Stop TB" to "End TB". A new vaccine, to replace the less efficacious BCG vaccine, is now being piloted, and may help stop TB transmission.

87. However, Myanmar is far from that. It has built up a high TB burden over the years, and TB may flair up as people age, or become undernourished and immune-deficient. WHO estimated a TB prevalence of 473/100,000 in 2013, and 230,000 new TB patients every year. About 62% of these estimated new TB patients were notified, of which 30% were smear positive. The treatment success rate was estimated at 85%. That means that just over half of new TB patients is identified and properly treated, and 43,000 infective TB cases were missed in 2013. About 9.2% of identified TB cases also have HIV, and about 5% have MDRTB, most likely with more or less similar ratios among non-identified cases.

88. While TB has a much higher burden of disease and mortality than malaria and HIV/AIDS, its control received much less funding. For example, the 3Dfund, financing half of all HIV/AIDS, malaria and TB control in the country for several years, only allocated 13% of its budget to TB control. HIV/AIDS and malaria are simply drawing more attention. However, TB may be a greater public health risk in the long term due to its mode of transmission and fewer control options if MDRTB spreads across the globe. Myanmar's priority is to find all infective cases, and properly manage all MDRTB cases. This will require better access to TB services in underserved areas, and improved diagnostic and treatment capacity closer to home.

c. Malaria Control

89. Myanmar's climate and ecology are suitable for malaria transmission. Malaria was for many years the number one public health problem, but has started to decline due to malaria control efforts, improved availability of antimalarial drugs, deforestation, and urbanization. It is now increasingly a problem of high risk groups including forest workers and migrants. Several states in the north-west, with more forest cover, and the south east, with more migrants, have the highest burden of malaria. Even so, malaria remains a major public health problem across the country.

90. The malaria morbidity rate reduced 4-fold from 1990, to 6.4/1,000 cases in 2013. Mortality reduced more dramatically with earlier diagnostics and improved clinical case management. Interestingly, improved laboratory capacity (early detection) is associated with mortality reduction but not with increased case-finding, perhaps because it is linked to patients who already have access to services, or the diagnostics are not linked to a public health response. Use of insecticide treated bed nets, protective clothing, repellents, indoor spraying and outbreak response are more likely to reduce morbidity. The Integrated Household Living Conditions Survey 2009-2010 found that only 11.1% of children below the age of 5 slept under insecticide treated bed nets. The 2011 Living Standards and Expenditure survey found that only 10% of children aged 4 years sleep under bed nets, with the lowest use in Bago and Mandalay regions and the highest use in Kayah and Mon states. Since then, massive bed net distribution by 3DF and GF in particular, up to 0.75 million bed nets in 2013 alone, should have improved bed net use.

91. The GMS is the epicenter of artemisinin resistant malaria. The malaria epidemiology in Myanmar's border areas is complex, and is related to fluctuations in migrants in turn related to major events, mixing of partly immune and non-immune people, including migrant workers, exposure in forests, plantations, settlements, and refugee camps,²² and mobility of infected persons. Large numbers of Anopheles can become infected before people seek treatment. Besides Artemisinin-based combination therapy, chloroquine and fake medicines are commonly used. However, no major malaria outbreaks have been reported in 2013.

92. To deal with drug resistant malaria in Asia, WHO is leading an Asia Pacific effort for malaria elimination in Asia by 2030 – no malaria, no resistance. A large number of partners are active in malaria control, including many NGOs. The Global Fund has returned to Myanmar in 2012, and is now the major partner in malaria control, funding up to half of the total malaria budget. However, future GF support for Myanmar is likely to scale down. A major concern is the strategic and programmatic coordination of the multiple partners involved. MOH is leading a malaria technical taskforce to provide strategic and technical direction and encourage participation, knowledge sharing and reporting.

93. The Asia-Pacific Leaders Malaria Alliance (APLMA), established at the East Asia Summit in 2012, is a high level governments and partners forum co-chaired by the President of Viet Nam and the Prime Minister of Australia to generate political commitment, financing and cooperation for malaria elimination in Asia Pacific. ADB is the secretariat for APLMA. ADB is also managing the Regional Malaria and Other Communicable Disease Threats Trust Fund, funded by the Governments of Australia and the United Kingdom, to finance malaria projects in Asia Pacific.

²² Bhumiratana, Adisak, et al. Border Area Malaria Associated with multi-drug Resistance on Thailand-Myanmar and Thailand-Cambodia Borders: Transmission Dynamic, vulnerability, and Surveillance. Mahidol University. 2013.

d. Dengue

94. According to WHO, dengue fever is the world's fastest growing vector-borne disease. Epidemics have become progressively larger. Curative treatment for this viral disease is only supportive, and insecticides and community clean-up campaigns of vector breeding sites have had only a transient and limited effect. Expansion of urban low income habitats and increased travel and trade are linked to the resurgence of dengue disease. Climate change also may affect transmission. Unlike most other diseases, sequential infection with the four different serotypes increases the risk of severe illness.

95. Myanmar's dengue prevalence has increased significantly, to a rough estimate of 200,000 cases per year and 1,000 deaths, and is spreading from urban into rural areas. However, no major nationwide outbreaks were reported recently such as in Cambodia. Local outbreaks, causing mostly mild cases among adults and sometimes serious cases and deaths, in particular among young children, are related to poor environmental hygiene. Mortality due to dengue hemorrhagic fever (DMF) is estimated at less than 1% with proper treatment, but can be much higher where treatment is lacking.

96. Dengue surveillance and response is mostly symptomatic, based on clinical signs due to lack of funds for rapid tests, and therefore unreliable. Recently, the government hired 4,000 public health inspectors, which should help improve dengue surveillance and control. Myanmar's National Dengue Control Program is mainly financed by the government, with limited partner interest. The program could be fully integrated in general surveillance and response for notifiable diseases, as it may initially be hard to distinguish dengue from more dangerous hemorrhagic fevers. Also, dengue serotypes come and go, and some of these may be more infectious and/or more pathogenic.²³ In addition, dengue surveillance and response also provides good training opportunities for outbreaks of EIDs.

e. Other Communicable Diseases

Neglected Tropical Diseases

97. Parasitic diseases, in particular soil transmitted helminthiasis (STHs) and food-borne parasites, though mostly not fatal, cause a major burden of diseases including malnutrition and reduced resistance against infection. The STH parasitic load is higher in the northern provinces, with infection rates ranging above 50%. Mass drug administration (MDA) for pre-school and school children and women of child-bearing age (WCBA) has reduced the burden of STHs, but coverage is still low. However, as entire villages are not being treated for STHs, the infections in these target groups quickly return. While the total cost of STH MDA is perhaps \$1 million annually, and this is one of the most cost-effective interventions, there are insufficient funds for STD/MDA.

Japanese encephalitis is a viral disease for which vaccination is available for high risk groups. However, it is most prevalent in northern mountains and hilly regions with security problems, and vaccine coverage is likely to be low in these areas.

²³ Hlaing Myat Thu et al. Myanmar Dengue Outbreak associated with Displacement of Serotypes 2, 3 and 4 by Dengue 1. *Emerging Infectious Diseases* • www.cdc.gov/eid • Vol. 10, No. 4, April 2004. Brisbane.

Immunization

98. Myanmar has prepared a comprehensive multi-year plan (CMYP) for the Expanded Program on Immunization for 2012-2016 as part of the National Health Plan NHP 2012-2016, and the Myanmar Health Vision 2030 (2011-2030). Based on the Global Vaccine Action Plan (2011-2020), the national EPI program provides immunization services to children below the age of one year and pregnant women. Children below one year receive eight antigens. Immunization status for both children and women is reportedly above 85% in most states and regions. The country aims to maintain tetanus and polio-free status, eliminate measles and rubella, achieve universal coverage, and introduce new vaccines. Myanmar is working with neighboring countries in the control of vaccine preventable diseases: in 2013 it was agreed to identify high risk populations, share data on EPI surveillance, and synchronize activities where possible.

99. Priority will be given to reaching every community (REC) strategy. In border and hard-to-reach areas, notably in Shan East, Shan North, Kachin, and Rakhine state, local authorities organized advocacy meetings to promote immunization. The most challenging problem has been lack of staff to immunize all women and children. Cold chain evaluation is being conducted regularly. New developments are the successful introduction of a pentavalent DPT/HepB/Hib vaccine, and measles second dose, cold chain transport, and school-based immunization for tetanus and diphtheria. The National Committee for Immunization Practices has recommended introduction of several new vaccines. GAVI is funding a measles-rubella catch up campaign for 9 months to 15 years old children. The EPI funding gap currently stands at about 30%.

IV. PROJECT SCOPING

a. Strategy and Program

Government

100. Since 2011, following years of economic isolation, Myanmar has embarked on a program of four sets of reforms – political, institutional, economic and social – aimed at a return to democracy, inclusive economic growth, and social development. Parliamentary elections have been held and a new government has been formed.

101. The government's strategic planning process of long term plans, five year plans, and medium-term frameworks is complex.²⁴ Reforms are guided by the framework for economic and social reforms, 2013²⁵ and the long-term national comprehensive development plan (NCDP).²⁶ The concept of equity has been included as part of the basic principles of the country, enshrined in successive constitutions.²⁷ The government's overall goal is inclusive economic growth and poverty reduction, while facilitating reduced vulnerability to natural disasters and climate change and the promotion of economic, social and political reform processes.

102. Important new features are community driven development institutions that support local governance in service delivery; enhancement of employment opportunities for women and men;

²⁴ Government of Myanmar. Medium-term Priority Framework (2011-2014).

²⁵ Ministry of national planning and economic development. 2013. Framework for Economic and Social Reforms – Policy Priorities for 2012-2015 towards the Long-Term Goals of the National Comprehensive Development Plan, January 14, 2013 (MNPED, 2013).

²⁶ UNDP. 2012. *Country Program for Myanmar (2013-2015)*.

²⁷ Government of Myanmar. 2008. *Constitution of the Republic of Myanmar*.

and township-led development plan, formulated through consultation with women, youth and marginalized populations. The national strategy on rural development and poverty alleviation²⁸ has eight focus areas with an emphasis on rural productivity. The government has established planning and implementation committees and state/region, district and township levels.

103. The National Health Policy (1993) included an objective to extend health services to rural areas and to the border areas where the ethnic groups live.²⁹ Another important law is Prevention and Control of Communicable Diseases Law of 1995, revised in 2011.³⁰ The Department of Public Health is responsible for regional and cross-border cooperation, the Central Epidemiological Unit (CEU) in the DPH is in charge of surveillance and response. The National Health Laboratory in the Department of Medical Services is responsible for laboratory services, and the DMS is responsible for infection control in hospitals.

Partners

104. Partners have played a major role in the health sector, up to 10% of health sector financing. During the military rule, the UN agencies and the 3DF mainly supported NGOs to provide services, sometimes in collaboration with public providers. After establishment of a civilian government and lifting of economic sanctions, partners led by the World Bank and the Global Fund are preparing to fully reengage with the government. There are also important NGOs such as the Myanmar Red Cross Society, and private sector partners such as PSI. Partner information is being collected and disseminated. The National Myanmar Health Sector Coordinating Committee provides oversight for CDC and MNCH. Sector-wide strategic consultation processes between government and partners are also in place. At subsector level, technical groups of government and experts work together on program development. However, in terms of intensity and expertise, there is much scope for improvement.

105. The Myanmar Health Sector Coordination Committee, in particular the Health Governance Group, has been working on a health sector reform agenda for Myanmar's health sector. It proposes a phase approach toward universal health coverage, starting with the provision of a basic public health care package that is of sufficient quality and free for all except the formal sector. The outline that has been circulated does not mention the role of states/regions and townships, which is important in a devolved setting, and it also does not mention the different dynamics of regional health security whereby one case of EID is one too many. But given its strong focus on the poor and border areas, this approach is very useful to build public health security in border areas.

106. The Myanmar health sector receives substantial external assistance, including from the Global Fund for HIV, tuberculosis and malaria, from the 3MDG fund or MNCH, from GAVI for immunization, from UN agencies for their traditional priorities, from the World Bank for health sector financing and essential health services, and from many bilateral agencies and NGOs, as also summarized under various headings in Appendix 1 and under specific diseases.

107. Specifically, for IHR/APSED, the government primarily receives financial and technical support from the WHO. Other specialized agencies such as CDC Atlanta, Pasteur and WHO collaborating centers provide various technical assistance. However, there is currently no major financier for helping Myanmar achieve IHR core capacities, currently estimated at around 60%.

²⁸ International Fund for Agricultural Development. 2014. *Myanmar Strategic Opportunity Program*. Rome.

²⁹ Ministry of Health. 1993. *National Health Policy*.

³⁰ Ministry of Health. 2011. *Prevention and Control of Communicable Diseases Law 1995, Revised 2011*

The USA Global Health Security Agenda has included Myanmar on its priority list but so far no support has materialized. However, this is expected in the near future, starting with assessments. ADB is well positioned to support IHR/APSED given its regional leadership capacity, engagement in regional connectivity, and regional project experience.

Asian Development Bank

108. ADB has had several health sector projects in Myanmar, including for Yangon hospital, in the late 80s and avian influenza control in 2004. ADB performed regular country economic analysis including a review of the health sector, which provided an update of developments. Myanmar has been a partner in GMS workshops and forums since 2004, but did not get direct financial support. Myanmar is currently supported with grant projects for HIV/AIDS control and malaria control in border areas. This PPTA is preparing for the GMS Health Security project.

109. ADB's overall goal is poverty reduction according to ADB Strategy 2020, and regional cooperation is one of the pillars of this strategy.³² The GMS partnership strategy prioritizes, among other issues, communicable diseases control, to mitigate the risks and negative impacts associated with increased regional connectivity, industrialization, urbanization, and economic growth, in particular in border areas and along economic corridors.³³

110. ADB's Myanmar interim country partnership strategy (ICPS) 2012-2014, extended to 2016,³⁴ emphasizes transport; energy; agriculture and natural resources; education; and urban development, including water and sanitation. Prior to reengagement with Myanmar in 2012, ADB had not had operations in the country since 1988. As a member of the GMS program, however, Myanmar has participated in ADB-assisted regional activities over the last 20 years, including small activities in communicable disease control. ADB supports communicable disease control in Myanmar, with emphasis on integrating various communicable disease control initiatives for EIDs, malaria, tuberculosis and HIV/AIDS under one umbrella.

111. ADB has assisted IHR/APSED implementation and CDC in the GMS (Cambodia, Laos and Viet Nam) since 2000. The first GMS Regional Communicable Diseases Control (CDC) Project, 2004-2009, and the Second Regional Communicable Diseases Control (CDC2) Project, 2010-2015 focused on (i) strengthening the national communicable disease surveillance and response system; (ii) improving laboratory services; (iii) control of dengue and neglected tropical diseases (NTDs); (iv) provincial capacity building in planning and training for CDC; (v) community-based CDC in border districts, focusing on lagging villages; and (vi) strengthened regional cooperation capacity for CDC. Currently ADB also provides GMS support for malaria³⁵ and HIV control³⁶ for Myanmar but it is too early to evaluate the performance although there have been initial delays. ADB also supports GMS food safety, and improving resilience to climate change.

112. Lessons learned from previous CDC projects include the importance of (i) targeting vulnerable groups, in particular MMPs; (ii) strengthening diagnostic and treatment capacity in the remote provinces and districts; and (iii) improving rapid response to and management of epidemics. CDC1 was evaluated as satisfactory. ADB support for the GMS Health Security project will also depend on good performance in CDC2 and HIV projects.

³² ADB. 2008 Strategy 2020. Manila.

³³ ADB. 2012. GMS Strategic Framework. 2012-2022. Manila.

³⁴ ADB. *Myanmar Interim Country Partnership Strategy 2015-2016*. Manila.

³⁵ ADB *Malaria and Communicable Diseases Control in the GMS*. 2014.

³⁶ ADB *GMS Capacity Building for HIV Prevention Project*. 2013.

113. CDC2 is generally doing well in surveillance and response, although with some bottlenecks, such as in logistics and financing outbreak response in non-ADB assisted provinces. Laboratory services in 10 provinces are being improved and expanded with microbiology. Dengue control will need to be decentralized if it is to be made more effective. Deworming has high coverage. The model healthy villages sub-output, after a slow start, is rolling out and provides important insights into CDC at community level in border areas. At the same time, provincial capacity building for staff training was curtailed by interdepartmental differences. Regional cooperation activities did well, but it was felt that these should be more closely linked to project priorities rather than standalone knowledge management activities.

114. CDC1 and CDC2 had a broader focus on other diseases of regional relevance, as well as addressing gaps in provincial capacity, and reaching out to border villages. Health security cannot be achieved without health system strengthening. While this is largely addressed through other sector developments, specific gaps may need to be addressed that particularly affect health security, such as improving sector monitoring systems, and improving access to health services/CDC in hotspots.

b. Proposed Project Scope

115. The proposed project goal is averted morbidity, mortality, poverty, and economic impact due to EIDs and other communicable diseases of regional relevance (CDRRs) in the GMS.³⁷

116. The proposed project outcomes are (i) CLMV public health security system strengthened, and (ii) timely and effective control of EIDs and other communicable diseases in targeted border areas and economic corridors in CLMV countries, including for migrants and mobile populations, ethnic minorities, and other vulnerable groups (MEVs).

117. The proposed project outputs are as follows:

(i) **Strengthened regional, cross-border, and intersectoral collaboration and CDC in border areas and along economic corridors, in particular for MEVs.** MOH has made progress with regional information sharing, cross-border cooperation, and knowledge management. In border states/region, MEVs equally or more at risk of infectious diseases are not being reached with regular health services, in part as public health offices are not directly responsible for health services in factories and casinos. MOH noted that CDC, and basic health services in general, are difficult to provide in remote border areas as staff benefits do not match local living conditions and costs in these locations. MOH wants to extend government services to reach MEVs in border areas, which will require cooperation with the Ministry of Labor and Vocational Training and others. Under this component, it is proposed that the project supports (i) regional, cross-border, and inter-sectoral information sharing and coordination of MEV services and outbreak control among GMS countries (ii) harmonization of regional, cross-border, and intersectoral surveillance and control strategies, (iii) regional capacity for evidence-based CDC, and (iv) improved CDC for MEVs along borders and economic corridors in targeted border states/region. Support is needed for information systems, technical forums, services for MEVs including mobile clinics, and vector control measures.

³⁷ CDRRs include EIDs, HIV/AIDS, malaria, tuberculosis, dengue, fevers of unknown origin, diarrheal diseases, other respiratory infections, measles, polio, other childhood infections, and Japanese encephalitis.

(ii) **Strengthened national disease surveillance and outbreak response systems for CDRRs in targeted states/region.** MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis are strong. However, the system needs to be more computerized and deepened to reach all health centers and perhaps communities, e.g. with syndromic reporting. Linkages or integration among surveillance systems and with HIS should also be considered. MOH also has capacity for disease outbreak response, at central, provincial, and district levels, but it needs to improve preparedness and response capacity. Under this component, it is proposed that the project supports (i) strengthening syndromic reporting at community level, (ii) computer and web-based reporting including information technology support, (iii) integration of surveillance, HMIS and registration systems, including linking clinical and laboratory surveillance, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport and personal protective equipment, and (vi) improving capacity of border posts to identify and handle CDRRs. Support is needed for system design, IT equipment, staff and village health worker training, field epidemiology training, simulation exercises, outbreak response vehicle and equipment.

(iii) **Improved laboratory services and hospital infection prevention and control.** Provincial health facilities are lacking in terms of laboratory quality and biosafety. Pre-service and in-service training of laboratory staff are insufficient. The quality assurance system is in a nascent stage, and there is no national laboratory audit and certification system. MOH needs to expand its capacity for diagnostics of CDRRs, drug resistance, food poisoning and toxicology. Only few major hospitals and communication hubs have capacity for managing suspected cases of EIDs, including preparedness plans, patient transport arrangements, and quarantine facilities. Second, to reduce hospital infections and potential spread into the community, the WHO hospital infection prevention and control (IPC) program is being rolled out. Priorities are daily infection control management and focal points and ensuring basic facilities for cleanliness, personal hygiene, and waste management. While case management for HIV, malaria and tuberculosis is well established, case management of infectious diseases including EIDs, dengue and childhood infections need to be improved. Under this component, it is proposed that the project supports improvement of (i) laboratory biosafety and quality of services, (ii) pre-service laboratory training program, (iv) laboratory quality assurance system, (v) analyze causes of CDRRs, drug resistance, and other public health hazards, (vi) general infection prevention and control in hospitals, and (vii) case management of specific diseases (e.g. dengue). Support will be provided for laboratory assessment, standard operating procedures, staff training, laboratory equipment, transportation of specimens. Additional supplies, e.g. diagnostic equipment and rapid tests for HIV, tuberculosis, malaria, dengue, and other neglected emerging diseases will also be needed.

118. Linked to the overall GMS project scope, five states and one region have been identified, in the north-east (Shan north, Shan east, Kayah, Kayin and Mon States, and Tanintharyi region). Twelve townships were identified, six capital townships and six major border townships, based on (i) border area/economic corridor, (ii) presence of hotspots/uncovered population including MEVs, and (iii) accessibility and referral services. Within the border districts and along economic corridors, hotspots and population that do not access services will be identified. Selection criteria will also consider cost-effectiveness of reaching and having impact on these MEVs. Variations in population, disease patterns and services will require different responses, e.g. districts may have more malaria, dengue, HIV or

tuberculosis depending on location. Also, township implementation capacity varies considerably. The proposed project should support a customized bottom-up district and provincial planning approach as part of the regular annual planning process. A range of interventions may be chosen based on disease priorities, health services capacity, and funding constraints.

c. Proposed Project Management and Issues

119. The project will be implemented by MOH through the Department of Public Health, the Department of Medical Services, and the National Health Laboratory, and public health offices in five states and one region. The project will be implemented over a 5-year period beginning early 2017. The project completion date is 30 June 2022.

120. The MOH strategic health committee will guide national project implementation. The Ministry of Finance will open a pass-through account at the treasury and transfer funds in local currency to MOH. MOH will manage the imprest account. Selected departments and states/region will be implementing agencies (IAs). However, targeted states/region will largely implement the project through their regular divisions, rather than setting up provincial project management units (PPMUs). Each office may need a program officer and an assistant accountant. Major procurement will be done centrally.

121. The advisory regional steering committee will guide regional coordination and activities and advice on project implementation. It will be hosted and chaired by each country on rotation basis. The regional coordination unit (RCU) to support regional activities is currently hosted by MOH Lao, and may be continued with grant financing, or moved to another country.³⁸

122. The project modality is proposed. However, the project will not be a self-standing intervention, but help the government strengthen the regular public health system through its various programs such as regional cooperation, border area health services, surveillance and response, infection prevention and control, and laboratory services. The project will build on earlier support for CDC, and support current policy and health system development.

123. As mentioned above, a township-customized approach is proposed to ensure effective and efficient investment. Each township will, as part of its regular annual health plan, propose project investments including, for MEVs, and gender and social dimensions, based on the agreed scope; and staff capacity, facilities, and recurrent budget support. Assessment, planning and approval of these plans will be done in phases in view of limited central capacity for staff training, procurement, and commissioning of equipment.

124. MOH has demonstrated capacity to procure goods and services at national level, although the process is complex. Most equipment to be purchased will be for state health laboratories and outreach services. The PMU should engage competent, mid-career national health professionals to work as project managers. Given a ceiling on the salary of national consultants, contracting a firm to provide technical support is to be considered. The government needs to ensure adequate government leadership in the central PMU.

³⁸ In the first CDC project, the RCU was based in Hanoi.

d. Safeguards and Risk Management

Poverty

125. While overall poverty has declined to about 16%, there are major rural urban discrepancies. Poverty is even more prominent in certain ethnic groups and will show even more variation. However, rural poverty is difficult to assess based on standard criteria, and perception of poverty may be quite different. For those accessing medical services, spending on health care is probably a major reason for slipping deeper into poverty. Poverty will also affect accessing services for infectious diseases, hence a case should be made, under the new health policy, for ensuring free health care for the poor, and free health care for all for the first 24 hours, for example. Furthermore, suspected or actual dangerous infectious diseases should be treated for free. Even transport may need to be subsidized. The interlinkage between poverty and infectious diseases needs to be further investigated. A poverty and social assessment has been prepared based on ADB's Social Safeguard Policy requirements, including summary poverty reduction and social strategy.

Ethnic Groups

126. Myanmar's socio-demography with ethnic Burmese mostly in the river valleys and deltas, and ethnic minorities in the surrounding mountains and plateaus is historically linked to migration, conflict, economic opportunity, and likely also malaria and climate adaptation. However, modern drivers of conflict have more of an economic basis than anything else: control of national resources, trade, and agriculture including opium production. While 40% of the population belong to some 100 ethnic minorities with different languages, a large proportion of these groups is already integrated and participating in modern society, even though there will be issues of equal opportunity etc.

127. In several districts, the central authorities are in a fragile truce with local warlords. This invariably affects local economies, education, and health services delivery, as is for example experienced in polio eradication. Hence, plans for addressing the needs for ethnic minorities have to be realistic, and foremost require much more effort in building relationships with target groups. Reaching these groups is costlier and may be perceived as more inefficient, compared to large needy populations elsewhere. The poor health of these people, if included in surveys, would not only reduce MDGs, but constitutes a national health risk as source of infections and drug resistance.

128. The Myanmar Government has various policies and guidelines in place to improve social services for the remote ethnic minorities in border areas. Studies have shown that services are often not available in the most problematic areas, or there is lack of staff, and education methods are typically top down rather than participatory, and sometimes facing language problems.³⁹ A first priority is engaging ethnic groups in dialogue and exchanging information, followed by a practical participatory planning process. Grooming local persons to become professional health staff is perhaps already a government strategy. Testing and adopting appropriate disease control strategies for these groups are also needed.

³⁹ ADB. Build It and They Will Come. Lessons from the Northern Economic Corridor: Mitigating HIV and Other Diseases. 2009. Manila. The research was led by Chris Lyttheton, Ass. Prof. Macquarie University, Australia.

129. An ethnic group development plan was prepared for the project. The project indigenous people category is B in view of the risk that proposed interventions for MEVs financed under the project do not materialize. Mitigating actions have been proposed.

Gender

130. Myanmar's ethnic diversity and cultural norms and customs also imply that gender issues are different in various groups (some groups, like in south China, are matriarchal). However, Myanmar is by and large a male dominated society, with the majority of men and the more conservative women claiming women have the same rights and opportunities as men, or endorse traditional roles of men and women as normal, while younger people and aid organizations challenge these views. The Gender Inequality Index (GII) in 2013 ranked Myanmar 83 out of 149 countries surveyed, better than the 150 out of 189 countries for HDI.

131. Female participation in the labor market is higher than male, 85.7% compared to 82.9%, but women typically hold lower positions on average. In terms of education, adult women and men, 18% and 17.6%, respectively, have reached at least the secondary level of education. The 2008 Constitution does not mention about women's representation in government. In 2009, there were no female members at the highest level of government. In 2014, there were 2 female ministers and about 25 female legislators.

132. Violence against women, particularly sexual violence in the context of armed conflict, is widespread. Serious discriminating practices for women are more likely to occur in rural areas including polygamy; child marriage; mobility restrictions; male inheritance rights; patri-location; dowry practices; male decision-making in households and government; and, domestic violence. Women are at risk of dying of maternal complications, and more likely to suffer from malnutrition, certain infectious diseases, and lack of access to services.

133. Myanmar has ratified international conventions. Gender equality is also enshrined in the 2008 Constitution: Article 348 states the Union shall not discriminate [against] any citizen based on race, birth, religion, official position, status, culture, sex and wealth. However, Myanmar's customary laws are discriminatory and reinforce stereotypes. While local governments lack staff, preference is given to engaging males as females are considered less suitable, capable or flexible for work assignments due to being seen as more vulnerable and having family obligations. NGOs demonstrate otherwise and employ a higher number of female staff and often have female leadership, but these systems are on opposite ends and cross-overs are unusual, thereby reducing the chance for effective NGO participation. Partners have mostly been engaging NGOs and are expected to advance the gender agenda. An evaluation of the 3DF noted, for example, insufficient efforts of the UNOPS-managed program to promote gender dimensions in project activities. It partly explained this by the difficult working environment at the time, with stifled relationships between partners and government.

134. At present, the Ministry of Social Welfare, Relief and Resettlement is leading reforms to enhance gender equality and empowerment in collaboration with other government agencies, civil society, academia and the international community. A National Strategic Plan for the Advancement of Women (2013-2022) already exists, but is almost unknown also among women NGO's and activists. A common view among stakeholders is that gender equality needs to be integrated as a crosscutting issue and mainstreamed in all areas.⁴⁰ The first step is creating awareness that gender is an issue. Health sector support will need to consider accessing

⁴⁰ Nora Pistor. Myanmar Institute for Integrated Development.

women in rural areas, addressing special needs of women, engaging and training women, participation of women at all levels, and disaggregated monitoring.

135. Based on gender analysis, the project is categorized as gender mainstreaming. A gender strategy and action plan has been prepared by consultants which needs to be concurred by MOH.

Environment

136. Myanmar is participating in regional efforts to improve IPC led by WHO. Based on the bi-regional strategy for improving laboratory services, biosafety and in general handling of laboratory wastes is an important environmental concern. Efforts to improve IPC for hospitals will also have environmental dimensions that need to be assessed. Besides, programs for control of HIV/AIDS, tuberculosis, malaria and dengue have to consider clinical case management and waste management to prevent transmission of diseases, and the potentially harmful effects of pesticides to kill mosquitos.

137. The project is assessed as environmental category B implying that each state/region will need to prepare an environmental management plan for its interventions. A resettlement framework was also prepared but no civil works are foreseen at the moment.

V. ADMINISTRATIVE ASPECTS

Governance

138. MOH is responsible for regulatory functions, The Department of Health Planning is the center for national health planning and financing. The Department of Medical Science manages universities and training institutions. The Ministry of Home Affairs has started to register consumer-protection groups. Professional organizations include the Myanmar Medical Association, The Myanmar Nurses' Association, and the Myanmar Health Assistant Association. The Myanmar academy of Medical Sciences plays a think tank role (ref: HIT, page 40). The National Health Committee, since 2011 chaired by the Minister of Health, leads a top-down policy and plan formulation process. The 1993 National Health Policy is expected to be updated with broader participation of stakeholders (HIT). Following deconcentrating in 1965, regional (state and division) health departments officially had the powers of staff transfer and financial management within the assigned allocations, with some fluctuations in actual control. Based on the new constitution, the government plans to form regional legislatures for actual devolution of authority. However, it will take time to groom leadership and confidence for local leaders.

139. Based on the National Comprehensive Development Plan (NCDP) 2011-2031, a NCHP has been formed. Similarly, comprehensive 5-year plan include 5-year health sector plans. Within this framework, planning is done by individual departments, although under the umbrella of an overarching consultation process. The result is a health system largely managed like vertical programs except for matters like personnel and financial management. There have been voices to return to the earlier People's Health Plans approach, more of an integrated and bottom up planning process. Various intersectoral collaboration mechanisms are also in place, in particular for food and drugs, occupational hazards, and disaster management. Collaboration with NGOs and the private sector is limited but a good example is TB control. The MMA plays a key role in quality standards in the private sector, and also in public-private partnership, in particular with support of Population Services International (PSI), which has helped develop the Sun Quality Health Network or (peri) urban areas and Sun Primary Health for rural areas engaging over 3,000

providers in almost 300 townships. This network could be a good basis for developing health insurance. Voluntary community-based health insurance pilots failed. Based on the 2012 Social Security Law, a social protection system based on mandatory and voluntary coverage is being developed.

140. The Myanmar HIT report concludes with a brief summary of governance issues. According to this report, “transparency and accountability are new terms arriving with the current civilian government.” People have learned to accept norms and not speak out for their rights. It continues to note that the government rule rather than serve the public. The market economy also comes with its shortcomings due to imperfect competition. Doctor-patient interaction in Myanmar is also based on information asymmetry and provider-dominated, and patient information is minimal.⁴¹ While the government machinery was a big black box, what made the system work was the professional ethics, dedication and persistence of health workers, as the example given in the introduction, about midwives taking initiative to rebuild their health centers after cyclone Nargis from whatever material they could find. This is the backbone of rebuilding Myanmar’s health sector. Hopefully, reform measures such as a broader participatory planning process, transparency, and accountability will push through.

Procurement Capacity

141. Surprisingly, little information is available regarding procurement. The system is centralized, but regions, districts and township offices are able to procure goods and services to certain limits and following established practices that dates back to colonial rule. Partner support mainly had to be channeled through NGOs. Some partners also groomed inappropriate procurement practices. The World Bank has started using the government system for procurement, which is encouraging. Major procurement reforms and capacity building are likely to be required although, as with many administrative fields in Myanmar, there is a pre-existing intrinsic core administrative capacity, thanks to intellectual heritage and good institutions that can be built on. A procurement risk assessment was prepared, which concluded that the procurement risk was high. A risk mitigation plan has been proposed.

Financial Management Capacity

142. Financial administration is also based on the British colonial system. Little is known about current financial management practices. The World Bank has conducted a fiduciary assessment in preparation of a sector loan. A financial management assessment was prepared, which concluded that the financial management risk was high. A risk mitigation plan has been proposed.

Monitoring and Evaluation

143. Monitoring and evaluation is first of all based on HMIS. Inspection systems are also in place. As part of the five-year planning cycle, extensive assessment of performance is done at all levels. However, more scientific evaluation like for health economics is in a nascent stage. The World Bank did or is about to do a national health accounts. Program evaluation done jointly with MOH and partners provides good information. More comprehensive reviews of the health sector such as the MOH annual review and the Myanmar Health in Transition are comprehensive but

⁴¹ South East Asian Journal of Medical Education. Inaugural Issue. 2007 Role of Medical Education in Patient Safety, referring to work published by Mugrditchian & Khanum, 2006.

less analytical. In preparation of a new health sector policy to replace the 1993 policy, more sector analysis is needed in terms of social security reforms, HRD, management and other areas.

VI. CONCLUSION AND RECOMMENDATIONS

a. Conclusions

144. Southeast Asia is an epicenter of EIDs and other diseases and drug resistance of regional significance with potentially major health, economic, and poverty impact. Regional cooperation is required for communicable diseases that rapidly spread across borders. Countries in the GMS are committed to build resilient national health systems and strengthen regional cooperation based on IHR and APSED.⁴³ Regional cooperation can also have benefits in terms of control of other infectious diseases of regional significance such as HIV/AIDS, tuberculosis, malaria and dengue, and leverage national control efforts.

145. Collecting information from government, field visits and partners, the consultant estimated that about 60% of IHR core capacities are in place. There are multiple access, human resource, technical, and financial constraints. The HIV/AIDS, tuberculosis and malaria programs are better resourced but also fall short of covering MEVs. It should be kept in mind that, although the burden of NCDs in adults is high, common infectious diseases cause most mortality among children and the poor in Myanmar. Efforts to improve high priority public health security and disease control programs will also help reduce this burden, and synergies should be explored and exploited.

146. Country level efforts to improve IHR core capacities with support of WHO have centered around MOH core capacities. Participation of communities, other ministries, private sectors, and other countries appears to be less. In particular, more effort needs to be made in reaching MEVs which may well be the weak link in the surveillance and response system. These MEVs are also more likely to have a higher burden of infections of regional significance. Achieving both public health security and UHC will require reaching these MEVs.

147. This rather long-term regional capacity building scenario is complicated by disturbing new information on regional diseases. Drug resistance may undermine treatment of HIV, tuberculosis and malaria, not only affecting patient survival, but allowing easier spread of the diseases. More disturbing information comes from the recent EHF outbreak in West Africa, where patients were found to be infective long after their recovery, and continued to harbor the virus in eyes and testis. This implies that people who had EHF can potentially cause a new outbreak much later. This may also be the case for other EIDs. At the same time, there is no national or even global surge capacity for a major epidemic. The implication is that absolute priority should be given to early identification and investigation of any suspected outbreak at community level using event-based or syndromic reporting, in addition to other measures such as indicator-based surveillance, general hygiene and infection control, screening mobile people, and isolation of suspected cases.

148. ADB is a financing institution with limited staff capacity and works closely with the World Bank on governance and WHO, IOM and other UN agencies on technical matters. ADB brings regional and multisectoral experience, and has been supporting the GMS Economic

⁴³ World Health Organization. *International Health Regulations*. 2005. Geneva. WHO South-East Asia Regional Office (SEARO) and Western Pacific Regional Office (WPRO). *Asia Pacific Strategy for Emerging Diseases (APSED)*. 2010. Manila.

Development Program and has gained considerable experience with GMS CDC projects. ADB has limited experience in the Myanmar health sector.

149. Given these challenges, opportunities, risks, and constraints, the PPTA team conducted sector analysis to identify project priorities for improving regional health security and CDC of regional relevance. Based on the initial project scope, proposed priority areas are regional cooperation and knowledge management, disease control for MEV, broadening and computerizing the surveillance and response network, improving biosafety and quality of laboratory services, and rolling out IPC.

150. In terms of institutional capacity for the proposed project outputs, the CEU is capable of managing the surveillance and response elements including regional cooperation, DMS has a program in place for rolling out IPC, and NHL is technically competent in improving laboratory services. The general implementation constraint is the readiness of the overall health system in transition. The main project specific constraints is perhaps MOH staff availability. There will be staff constraints in rolling out various programs for surveillance, laboratory, and IPC. Technical challenges in surveillance and response are to engage all communities, integrate and improve surveillance systems, engage the private sector, improve cross-border cooperation, and harmonize information and control strategies in the GMS. Even so, technical implementation should be handled by concerned departments to promote system integration and sustainability.

151. A major project risk is that MEVs are not being reached as the priority target population, in particular ethnic minorities and migrants, given operational constraints. Another project risk is that procured laboratory equipment is not based on needs and capacity of districts, and of poor quality. Procurement and financial management are also considered high risk in view of limited exposure of MOH to standard international practices. A project management unit (PMU) is likely needed to build departmental capacities in various technical and administrative areas.

152. While IHR assumed a basic health system is in place on which to build public health security, the Myanmar health sector has been seriously underfunded for major years and requires to be rebuild. Having said that, organizational and staff capacity has remained relatively high due to the staff professional ethics and resilience, and well-established institutions. MOH produces health and health services statistics for most of the country that however needs to be improved in quality. Health sector financing has improved substantially in the past 3 years. So there is a basic foundation to build on with core administrative capacity, an important asset. Even so, there are many current problems with governance and management, access to conflict zones and border areas, and quality of services affected by staff shortages, low pay, and insufficient support. The parallel system created by partners has done little to strengthen government capacity. Program capacities are not being shared, and government-NGO coordination is lacking.

153. IHR/APSED implementation is insufficiently mainstreamed among departments and sectors as part of broader disaster preparedness. IHR/APSED implementation lacks transparency in terms of status of IHR/APSED implementations, and lacks a comprehensive program approach, combining various action plans of MOH and WHO, that would help promote collaboration, improve know-how, explore synergies, mobilize resources, and address implementation risks.

b. Recommendations

154. The sector analysis supports the proposed project scope as it responds to major health and economic threats, is based on IHR/APSED, supports government priorities, supports MOH

policy and plan, supports reaching out to those not being reached as the main concern of public health security and tie to UHC, reflects integration of CDC under one umbrella to improve sector efficiency and effectiveness in anticipation of expected changes in aid funding, and proposes mitigating actions for identified implementation risks.

155. It is recommended that the Project has a strong focus on neglected border areas, meaning those border areas where there are no government or NGOs providing services. The government may want to explore using its own township teams to improve outreach in these areas, or contracting out, whatever is most suitable for the local setting. Reaching MEVs will require strong leadership, participatory planning and monitoring, and logistics at district/township level.

156. Major implementation constraints in MOH need to be addressed. Given staff constraints and financial management and procurement risks, a PMU is proposed to facilitate engagement of contractual staff and administrative, technical, and field support. The purpose of the PMU should be institutional and staff capacity building.

c. Preparatory Work

157. Data collection involved (i) review of surveys and report of MOH and other ministries, institutions, regional networks, and partners, (ii) visit provinces to collect information on the propose scope, and (iii) discuss subsectors with key government and partner representatives to fine-tune assessment and priorities. Provincial assessments used checklists, semi-structured interviews, and group discussions. For laboratory services, information was collected from a sample of proposed provincial laboratories. A sample of targeted sites was visited. In particular for procurement of laboratory and hospital equipment, more detailed assessment will be required.

158. The project activities and implementation arrangements need to be planned in more detail through consultation with state/region stakeholders, and included in the MOH and state/region annual planning and budget cycle so as not to delay the project upfront. State/region health offices will need to initiate a participatory planning process with townships, including mapping of MEVs, to determine specific project activities for MEVs based on local priorities. The first annual project plan and budget should be prepared in advance. Some areas will require legislation and SOPs such as for regional and cross-border cooperation and laboratory quality assurance and audit which should also be initiated as early as possible.

159. Gender, safeguards and risks assessments are in line with current sector views. Project gender, safeguards, and risk mitigation plans have been prepared, for endorsement by MOH and state/region health offices. Each state/region health office will carry out site specific Initial Environmental Examinations (IEEs) for its health facilities to receive project support according to ADB's environmental policy. MOH will also hold site specific public consultations with potentially affected groups. Each state/region health office will prepare an environmental management plan (EMP) based on proposed state/region project activities. The EMP will be submitted to MOH, other related government agencies, and ADB for review and concurrence.

Appendixes

- 1) Health Sector Summary
- 2) IHR/APSED Assessment
- 3) Problem Tree
- 4) Results-Framework

Appendix 1. Myanmar Health Sector Summary

a. Health Trends

1. As shown in table 1, Myanmar has achieved most of its health-millennium development goals (MDGs) by 2015.¹ Based on available data and calculations by the UN agencies,² between 1990 and 2015, the maternal mortality ratio (MMR) reduced from 580 to 178 per 100,000 live births compared to a target of 145 per 100,000 live births in 2015. The child mortality rate reduced from 109 to 36 per 1,000 live births compared to a target of 36/1,000 live births. The child malnutrition rate (weight by age) reduced from about 40% to an estimated 20% in the same period, all in line with MDGs. Iodine and iron deficiencies and stunting remain high. New HIV, malaria and tuberculosis cases have declined but there are concerns in view of new risk factors for the spread of these diseases including drug resistance and changing lifestyle.

Table 1: Health Indicators

Health indicators	Year*				Source
	2000	2005	2010	2015	
Population in million	42.6	30.0	51.7	53.9	WB
Life expectancy	62.1	63.6	64.9	65.9	WB
Population growth rate	2.0	2.0	1.3	0.8	WB
Infant mortality rate	59	51	44	28	WHO
Child mortality rate	80	67	56	35	WHO
Maternal mortality ratio/100,000	308	248	205	178	WHO
Under five malnutrition rate	29	27	23	20	WHO
Deaths due to HIV/100,000	17.3			21.6	WHO
Deaths due to Malaria/100,000	7.1			5.4	WHO
Deaths due to Tuberculosis/100,000	135			49	WHO

*Year or nearest year for which data are available.

WB = World Bank; WHO = World Health Organization

2. The country is facing a triple burden of diseases including communicable diseases, non-communicable diseases (NCDs), and accidents and injuries. NCDs including cardiovascular diseases, diabetes, cancers, and mental illness cause the bulk of morbidity and mortality in adults 40 years and above, and are related to population aging, lifestyle (smoking, and high intake of alcohol, salt and calories) and less physical work. Mental illness, suicide, road accidents, injuries, disasters and conflict are also major causes of mortality among adults. Infectious diseases are the major burden among children and the poor.

3. However, the burden of diseases on its own is not a good measure to prioritize investment as it does not consider potential disease burden, cost effectiveness and marginal costs. Communicable diseases have substantially reduced, but require major investments and efforts to keep them under control. Common infections contribute to low productivity and malnutrition, while emerging diseases, endemic infections, fake drugs, and drug resistance pose serious global public health threats. Common infections disproportionately affect the poor and are usually more cost-effective to prevent or treat.

4. There are major urban rural discrepancies in health indicators. In particular when disaggregated by region/state as in the 2012 MICS survey, major differences are apparent. Further improvement of MDG indicators will thus depend on meeting basic conditions and

¹ <http://www.undp.org.my/mdgs/myanmar-and-the-mdgs/>.

² <http://www.undp.org.my/mdgs/myanmar-and-the-mdgs/>.

services in rural areas. Improving life expectancy will also increasingly depend on promotion of healthy lifestyle, prevention of accidents and injuries, and specialized medical services. The same holds for control of EIDs, which can only be achieved if all parts of the country are engaged. While poor health of remote populations drags health indicators, it may not always be cost-effective to reach these populations. Balancing investments to manage burdens based on existing capacities and constraints will unlikely be the most equitable solution. However, there is no such choice for the control of EIDs, which is as good as its weakest link. Hence, for public health security, reaching isolated communities is essential, at a price. Accordingly, control of EIDs need to be included in the core package of primary health care as part of universal health coverage.

5. Based on hospital admission records in 2010-2011,³ conditions of pregnancy, child birth and puerperium constituted the highest burden of morbidity (17.9%), followed by infectious and parasitic diseases (16.7%) and injury, poisoning and certain other consequences of external causes (16.5 %). Communicable diseases, maternal, perinatal and nutritional conditions contributed for 47% of hospital discharges, non-communicable diseases 37 %, and accidents and injuries for 16%.

6. The leading cause of mortality was infectious and parasitic diseases. This was followed by diseases of the circulatory system, and injury, poisoning and mortality due to other external causes. The fourth cause was conditions originating in the perinatal period. Regarding hospital mortality, the contribution of non-communicable diseases was 42 % in 2010 and 45 % of all inpatient deaths in 2011, mainly due to cardiovascular diseases, followed by cancer and respiratory diseases. NCD risk factors are smoking (38% of adult males and 7% of adult females in 2010), high blood pressure (34% of adult males and 29% of adult females in 2010), and increasingly also poor diet, obesity and lack of exercise. Not much is done by the public sector on NCD prevention.

7. For children under five years of age, pregnancy, child birth and puerperium complications including slow fetal growth, fetal malnutrition, disorders related to short gestation and low birth weight, intrauterine hypoxia and birth asphyxia make up about half of all under-five mortality, with infections and malnutrition being other major causes of under-five child mortality.

b. Health sector performance

8. Besides health services, better education, infrastructure, water and sanitation, and income have no doubt contributed to achieving MDGs. Less progress has been made in access to safe drinking water (65% in rural areas and 81% in urban areas) and proper sanitation (75%). With low hanging fruits for achieving MDGs mostly in place, further improvement in health indicators will increasingly depend on changes in lifestyle, improvements in quality of services, and making specialized services available and affordable including for management of emergencies.

9. Given past financial constraints in the health sector, health services coverage is remarkably good, as shown in Table 2, with quite high immunization rates around 80%. Immunization coverage of migrant children in the Myanmar-Thai border area was also high. It should be kept in mind that this is a heavily sponsored program. Overall coverage of health services is less, but it shows the potential. According to WHO, about 43% of women received any type of prenatal care in 2015, which is low. Birth attended by trained personnel was better

³ MOH, Department of Planning. Annual Hospital Statistics Report 2010-2011. 2013.

at 71%, but if deducting a large urban population more likely to get these services, the rural shortfall is obvious. With current fertility rates, the contraceptive prevalence rate is probably underreported.

Table 2: Health Services Coverage

Health Service indicator	Year*			Source
	2000	2010	2015	
DPT3 immunization	82	85	73	WHO
Measles immunization	84	83	86	WHO
% mothers obtained at least one prenatal care visit	76	73	43	WHO
% births attended by trained personnel	46	57	71	WHO
Contraceptive prevalence rate	38	40	46	WHO
Antiretroviral treatment coverage of HIV infected pregnant women		14-65		WHO
Antiretroviral treatment coverage of People with advanced HIV infection		11-20		WHO
Smear-positive tuberculosis case detection rate	19	43		WHO
Sleeping under insecticide treated bed net				WHO
% of rural/urban population with safe water supply		65/81		WHO
% of rural population with sanitation		75		WHO

*Year or nearest year for which data are available.

10. Bed net coverage is high, in one survey in Kachin state there was 1 net per two persons or one insecticide treated bed net per 2.5 persons, and children below 5 years of age reportedly slept under a bed net. Coverage of finding and treating TB and HIV cases has increased.

11. The daily use of hospital beds per 100,000 population was highest in Yangon Region (89.4 in 2010 and 83.8 in 2011), and lowest in Rakhine State (16.6 in 2010 and 17.4 in 2011). The highest rate for both of the admission per 1000 population and the out-patient attendances per 1000 population were found in Yangon Region and Kayah State in two successive years. Outpatient attendance varied from a high 145/1,000 people in Yangon to a low 27/1,000 population in Ayeyarwady region. The 2011 statistics of Myanmar public hospitals are in Table 3. A simple calculation suggests 26 admissions and 72 outpatient visits per 1,000 people per year, which would be very low, in particular for outpatient visits. High out of pocket payment is probably a major reason for low use of health services in 2011, which should have improved considerably with increase in per capita income and health sector financing. The complementary coverage of health services of other providers is not known. In any case, low population coverage of health services will be core problem of UHC and public health security.

Table 3: Myanmar Hospitals Statistics 2011

1. Number of admissions 1,324,000
2. Number of discharges and deaths 1,322,000
3. Number of deaths 28,000
4. Number of discharges & deaths per 100,000 population 2,165
5. Number of patient days 7,842,000
6. Number of out-patient attendances 3,660,000 (?)
7. Number of deliveries 178,372
8. Number of surgical operations 338,000
9. Percent of bed occupancy based on available beds 47
10. Percent of bed occupancy based on sanctioned beds 51
11. Average number of inpatients per day 21,000
12. Average number of outpatients per day 15,000

- 13. Average duration of stay [in days] 5.9
- 14. Average turnover of patients per bed per year 29
- 15. Average turnover interval [in days] 6.5
- 16. Hospital death rate 2.14

12. The average number of in-patients and out-patients per day is increasing year by year. In 2011, each day 21,485 patients were admitted in, and 15,122 outpatients attended public hospitals. The highest number of out-patients and inpatients was found in general hospitals and stations hospitals, showing that station hospitals play an important access function. The out-patient attendance at union level was 60 per 1,000 population. That of Yangon Region had the highest outpatient attendance at twice the union level, and Ayeyarwady Region had the lowest attendance at half the union level. Usually there are more females than males attending services.

13. Surgical operation was performed in all public hospitals. The number of operation dramatically increased from 2009 to 2011 except in 16 bedded hospitals. Most of surgical operations were performed in general hospitals with specialist services and lowest in 16 bedded hospitals. Total deliveries in public hospitals were 178,372 in 2011. Overall trend of live births as a percentage of deliveries was a high 96.6% in 2011. The abortion rate among hospital admitted cases was 17.4% in 2011. Abortion cases were highest in station hospitals: 21.6% in 2011. The highest rates were found in Chin and Rakhine States 29.6 % and 26.1 % respectively.

14. The 2011 data, no doubt outdated but indicating trends and issues that may be validated, suggest underutilization of the public health system. There are multiple agencies providing services including military, NGOs, ethnic organizations, private services, and vertical programs. Even so, it is evident that there are access/population coverage gaps. As discussed below, there are also problems with quality and affordability, further affecting use of services, as discussed below. In addition, or because of that, bypassing lower level health services is common, and also higher level services are often bypassed for services abroad.

c. Sector Resources

15. In 2000, the WHO World Health Report ranked Myanmar 190 out of 191 countries in terms of overall health performance. Such low ranking, based on standard indicators, did not reflect the health status and services at the time, as services were carried out despite very low or no pay, supported by charity, and by finding alternative ways to obtain equipment and medicines where resources were lacking. However, given Myanmar's history and potential, health sector performance was indeed very poor. The current ranking of 141 is still low because of low public spending. It will take time to rebuild the health system, with increasing sector financing perhaps being the easier part to do. Furthermore, in particular for EIDs and other diseases of regional relevance, the public health system needs to be functional in all parts of the country, in terms of these being attractive services to seek help when seriously ill, and capacity to identify and report suspected cases, and provide initial case management.

16. The MOH is the main provider of health services, and finances about half the cost of its health services, the other half being mainly paid by patients out-of-pocket. Other providers are other ministries, in particular the military financed by Government, NGOs mainly financed by partners, and the private sector mainly financed by patients out-of-pocket.⁴ Health insurance is in

⁴ The Law relating to Private Health Care Services, 2007.

a nascent stage. Few private hospitals have started to emerge in urban settings. Most people rely on public hospitals for complicated medical care, or, if they can, go abroad.

17. The MOH emerged from the Health Services Administration under British rule, initially to serve government employees and plantation workers, with parallel systems for hospitals and public health services up to district level (civil surgeon and district health officer). All district hospitals were initially financed through a hospital finance scheme using various sources including local taxes and donations, but were brought under Government financing in 1953. Since then, medical and public health services have been integrated and separated several times. Most recently, parallel systems were reinstated to try to enhance preventive services. More importantly, health services have been delegated to states/regions, districts and townships (no reflection of this in the PHC approach paper of partners). Rural health services expanded rapidly from 1965. As in other countries, an initial MOH focus on CDC was replaced by PHC following Alma Ata in 1978, and again with more selective disease control and MNCH/FP services in more recent years, while the market for general health care increasingly shifted to private practitioners, and care providers.

18. The country's regions/states, districts, townships, sub-townships, and villages are covered by an extensive network of public health services down to the community level. MOH is the main provider in this network of health services. As the main provider, MOH is in a unique position to develop a comprehensive PHC system throughout the country, as proposed in the PHC approach paper. However, facilities are often bypassed due to lack of services, staff or supplies, in particular in remote and less secure areas, causing overload in the larger hospitals and increased health spending. Hospitals thereby capture most funding. Improving PHC will be a cost-effective way to address a high disease burden.

19. The military health services also have a large establishment, in particular also in remote areas, perhaps serving up to 10% of the population, for the most part military and dependents, but also other civil servants and sometimes the public. This system should be considered for disease surveillance and response.

20. In line with the National Health Policy, and more than in other GMS countries, ethnic health organizations, and NGOs such as Myanmar Maternal and Child Welfare Association, Myanmar Red Cross Society, and Population Services International are taking their share in service provision and their roles are also becoming important as the needs for collaboration in health become more prominent. However, these services are fragmented, using different packages, and financially aid dependent.

21. Community participation and support of religious organization has been particularly strong in the Myanmar health system, as it is part of citizen's responsibility and cultural heritage. Modern health services are seen as only one part of a more holistic concept of health care and wellbeing. A wide range of alternative health care is being used, including spiritual, ayurvedic, herbal, and nutritional. This has implications for outbreak control, as many patients first seek alternative care.

22. Curative services are provided by various categories of health institutions, under the Ministry of Health ranging from teaching hospitals, specialist hospitals, state/ division hospitals, district hospitals and township hospitals situated in urban areas down to station hospitals, rural health centers and sub-centers in rural areas. During the plan period of 2006-2011, the country had 897 hospitals with 42,634 hospital beds under the Ministry of Health. Hospital bed per 100,000 population is 71.06, and doctor nurse ratio is 1:1 in current situation.

23. Comparing MOH' Health in Myanmar reports of 2002 and 2012, Myanmar's public health infrastructure has strongly expanded since 2002. Public hospital beds increased by 75%, or one bed per 1000 people. Perhaps this reflects an underdeveloped private sector or creating better access to hospital care in remote settings. There is on average one government hospital per 50,000 population, half the catchment population compared to a decade ago, and one rural health center per 25,000 population, more or less the same as a decade ago. WHO estimates access to health services at 80%. It appears that most expansion was in major towns. Non-MOH public hospitals are still few. Besides, MOH is operating 14 traditional hospitals and 237 traditional clinics. In 2012, MOH embarked on improving health care for the elderly. Along with an increased demand for dealing with NCDs and accidents and injuries, this will put pressure on constructing of nursery homes. At the same time, MOH hospitals and health centers are in urgent need of maintenance, repair, and in many cases require replacement after years of neglect. Given limited resources, MOH may prioritize rural health centers for improving access, and on improving existing infrastructure.

Table 4: Public health infrastructure

Type of health facility	1988-1989	2000-2001	2011-2012	% increase 2011-2012 /2000-2001
Public hospitals	631	750	987	32
MOH hospitals	629	742	921	24
Non-MOH Public Hospitals	2	8	66	725
Hospital beds	25,309	31,913	54,503	71
Urban HC	64	84	87	4
Maternal and Child Health Center	348	348	348	0
Rural Health Center	1,337	1,402	1,565	12
Sub-Rural Health Center	na	5,657	na	
Dispensaries	247	346	na	
Traditional hospitals	2	10	14	40
Traditional clinics	99	214	237	11
School health teams	80	80	80	0

24. MOH has recently realigned sanctioned and available beds which has budget implications. In 2011, there were 74 beds per 100,000 population. The highest number of available beds per 100,000 population was found in Kaya and Chin States, where bed occupancy rates are also lowest. The highest bed occupancy rate was found in Bago (West) Region and Mon State.

25. Myanmar's population increased only by 27% since 1988. While, with economic growth, fertility rates may increase temporarily, population growth will remain modest given the current population structure. On the other hand, the number of government-employed and private health staff has increased rapidly, as shown in Table 5, in particular doctors in public hospitals, dentists, midwives and traditional medical practitioners. Partly this reflects the creation of new facilities that need to be staffed. However, maldistribution of staff is a major problem.

26. Myanmar's high burden of communicable diseases and chronic degenerative diseases would suggest that higher levels of staffing are needed at all levels, as suggested by partners in the approach paper. However, adding staff has major budget implications, and use of service is still low.

27. For every doctor, there are 1.7 nurses/midwives compared to 3 nurses/midwives as recommended by WHO, and for every 10,000 people, there are 5 doctors, which seems reasonable, and 5 nurses, which seems insufficient. Trends show that doctors are added at a faster rate than nurses and midwives. Between nurses and midwives, there appear to be too few nurses and too many midwives. Midwives perform multipurpose functions in rural health centers but are ill-prepared for that. Shortfalls of paramedical staff like for laboratory also need to be addressed. The renewed hiring of public health inspectors/officers who played a major role in disease prevention is a welcome development. The role of village volunteers will also need to be reviewed as part of a larger effort to restructure human resources for health.

Table 5: Human Resources for Health

Type of staff	1988-89	2007-2008	2011-12	% increase staff 1988-89 to 2011-12
Doctors	12,268	21,799	28,077	129
Public	4,377	7,976	1,1460	162
Cooperative and private	7,891	13,823	16,617	110
Dentists Public and Private	857	1,867	2,770	223
Nurses	8,445	22,204	27,244	223
Health assistants	1,238	1,788	1,536	24
Lady health visitors	1,557	3,197	3,371	117
Midwives	8,121	1,8098	20,044	147
Health supervisors	1,161	1,973	2,330	101
Traditional medical practitioner public	290	945	885	205
Traditional medical practitioner private	2500	5163	5867	135

Source: Annual Hospital Statistics Report 2010-2011

28. There are about 186 drug importers and 17,900 drugs registered at Myanmar FDA. FDA can take legal action to illegal drug importers, sellers and pharmacies. During 2013, it issued 2506 drug registration certificates, and 77 drug importation approval certificates. 254 drugs were tested in the drug quality control laboratory. FDA also notifies health providers in case of counterfeit and unregistered medicines. Major land border area crossings have mini laboratories for drug testing as per guidance of the United States Pharmacopoeia.

d. Health Policy and Programs

29. The Ministry of Health provides leadership, authority and oversight of all health services to ensure that all agencies meet minimum standards. The Myanmar health system comprise a large public health system, military services, ethnic health organizations, national and international NGOs, private clinics, paramedics, drug shops, herbalists, and other formal and informal providers. There is a lack of information about the standards and contributions of various providers. With low overheads at about 1% of public health spending, capacity to provide oversight and inspection of the private sector and NGOs is limited.

30. The National Health Committee was established in 1989 as a multi-sectoral body to provide stewardship and guidance for implementing health programs systematically and efficiency. It is to advice Government on sector goals and priorities such as universal health care, challenges such as sector financing, transition of services, and reaching all populations, sector management such as sources and uses of funds, and sector performance. Health committees are also in place at region/state, district, township, community and village levels.

The Ministry has established technical working groups with partners for each subsector, which meet regularly.

31. MOH manages a comprehensive and extensive nation-wide public health system, as described above. In accordance with the Constitution and the Government's commitment to the sustainable development goal of UHC by 2010, MOH aims to achieve the best possible health for all citizens by ensuring access to affordable, quality health care.

32. The National Health Policy 1993 commits to raise the level of health of the country and promote the physical and mental wellbeing of the people with the objective of achieving "Health for All" goal using the Primary Health Care approach. Among others, it aims to foresee any emerging health problem that poses a threat to the health and wellbeing of the people of Myanmar, so that preventive and curative measures can be initiated. Primary Health Care (PHC) is essentially a comprehensive package of basic health services build on priority community needs and participation, and including first referral services. MOH subscribes to international policies such as for reproductive health, communicable diseases control, and IHR/APSED.

33. The Government gives high priority to the health sector as a core pillar of sustainable socio-economic development. The Myanmar Health Vision (2000-2030), implemented through five year plans, is composed of 9 main areas: health policy and law; health promotion; health services provision; development of human resources for health; promotion of traditional medicine, development of mental health; development of health research; role of cooperatives, joint ventures, private sectors and NGOs; partnership for health system development; and international collaboration. Thus, MOH emphasizes the importance of NGOs and the private sector as key partners. It also emphasizes mental health, a much neglected area in Myanmar (WHO 2006).

34. The National Comprehensive Development Plan (2010-11 to 2030-31) will further guide short term plans and includes programs for health system strengthening (including health policy and legislation, UHC, HIS, e-Health, and township health system development); disease control including for NCDs; public health; curative services (including promoting quality of hospitals services, expanding health care coverage in border areas, promoting laboratory and blood services, and provision of essential medicine); traditional medicine; human resources development, and health research. There is no mention about control of EIDs or common infections, vaccination, and mental health. One apparent problem is the vertical approach to service delivery based on programs, which puts, for example, expanding services in border areas under curative services, which are more likely to be preoccupied with hospital services.

35. The NCDP also does not give much discussion and guidance on the multiple challenges facing the sector, including poor public health facilities, a triple burden of diseases, low public health spending, staff shortages, low pay, lack of quality standards, and sharp decline in ODA. Administrative functions and challenges, such as sector organization, governance, financing systems, and procurement and financial management capacity do not appear prominently.

36. Various laws and policies are in place to guide sector priorities and development, including for communicable diseases control, food and drugs, and border areas, with some of these being outdated. The Prevention and Control of Communicable Diseases Law (1995) (revised in 2011) describes functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation, reporting and control of outbreaks of epidemics

and penalties for those failing to comply. The law also authorizes the Ministry of Health to issue rules and procedures when necessary with approval of the government. Other relevant laws are the National Food Law (1997) and the National Drug Law (1992). These laws, while not new, provide sufficient leverage in the context of regional health security.

37. Despite innovative approaches in the health care delivery system, there are still many shortcomings. The following weaknesses could be observed in providing health care services in hospitals: inefficient hospital administration and health management at different levels; insufficient drugs and equipment; shortage of human resources and technology; improper referral system; improper hospital waste management system; improper medical recording and information system; ineffective supply system management.

38. Much less is known about the quality of health services. Compared to some other workforces, health staff in Myanmar, for a long period, received quality professional education. Also, the workforce impresses as disciple and dedicated. Specific studies have been done to highlight quality of services in particular subsectors. This field will need much more attention in coming years, including a better understanding of determinants of staff performance, in particular also regarding low pay forcing staff to seek additional business or work, security concerns and high cost of living in remote locations, transfers, and technical supervision.

39. The Hospital Care Program consists mainly of curative services. The general objective of the program is to improve the quality of health care services in hospitals. Among its specific objectives are to increase the ratio of bed to population from 62.07 per 100,000 population to 75 per 100,000 population by 2015; to increase the hospital performance indicators from existing figures by 2011; and to reduce the mortality rates in hospitals. In providing comprehensive health care to the community, new hospitals and clinics are being built and put into service as well as recruiting and training of manpower to meet the quantity and quality standards. Table 6 provides a list of activities. However, information on quality of care could not be documented.

Table 6: Hospital Care Program to Improve Quality of Health Services

<p>Objectives:</p> <p>To increase the hospital performance indicators from existing figures.</p> <p>To reduce the mortality rates in hospitals.</p> <p>To provide comprehensive primary health care for those residing in the border area.</p> <p>To ensure that every citizen has regular access to safe, quality, efficacious, low-cost and available essential medicines in every health care facility.</p> <p>To improve the quantity and quality of nurses and midwives in upgrading the primary health care and hospital medical care services to the people.</p> <p>To promote the laboratory and safety blood services to international standards.</p> <p>To promote the computerized inventory control and networking system.</p> <p>Strategies:</p> <p>Developing an equal access to health care services in urban and rural areas by establishing new hospitals in rural areas.</p> <p>Enhancing better quality of health care services by providing sufficient health man power and supplies.</p> <p>Conducting on the job training and refresher courses to improve the capability of the health care personnel.</p> <p>Improving the quality of private medical care.</p> <p>Priority Activities:</p> <p>Upgrading health facilities in terms of quality care.</p> <p>Ensuring safe medical care services in health facilities.</p> <p>Myanmar Essential Drug Programme.</p> <p>Upgrading the private medical care services.</p> <p>Improving the quality of nursing and midwifery services.</p> <p>Maintaining the standards of laboratory services.</p> <p>Logistics and medical supply and information networking.</p> <p>Strengthening of drug law and its regulatory mechanism.</p>

40. The Myanmar Essential Drug Project (MEDP) has replicated its activities phase by phase and now, all townships in primary health care level have been covered with essential drugs concept, rational use of drugs, estimation of drugs requirement, systematic management of drugs supply system and drugs counseling, Information, Education and Communication relating to use of drugs to community for compliance to essential drugs. It has adopted Community Cost Sharing (CCS) system for the drugs in all townships in the primary health care area and incorporated with Revolving Drug Funds system in which some township and district hospitals are now being implemented. The respective township (or) district medical officers have to establish the drug shop with revolving drug funds and replenish the required essential drugs with the approval and agreement by the Township Health Supervisory Committee, and they are proceeding with the system of Community Cost Sharing for the drugs only by the user. Revolving Drug Funds will serve as mean of establishing drug financing for the townships in primary health care area so that the Ministry of Health will be relieved of the drug budget for the primary health care area and may use the budget in other activities of health care in the country.

41. MEDP has also extended its activities to the General Practitioners of the country through the good offices of the Myanmar Medical Association and advocated them to select their essential drugs lists according to their area organization and services on the principles of essential drugs program of WHO. After covering the primary health care area under the first referral level of the country, MEDP has planned to extend its activities to the secondary and tertiary referral levels with development of Standard Treatment Guides under the guidance and supervision of the Hospital Therapeutic Committees.

42. Myanmar is under pressure to reform to improve the performance of the health system after years of neglect. A sector wide mechanism has been put in place to speed up the reform progress in coordination with the health partners. However, MOH departmental planning is often input rather than output driven, and focused on government assets, rather than on public health improvements. The nation health plan provides details. MOH capacity is constrained in terms of funding, human resources and specific expertise to guide states and regions. Most external funding bypasses MOH and goes directly to NGOs.

43. Among the major concerns are overcrowding of referral hospitals (with higher risk of hospital based, drug resistant infections), while peripheral facilities are underused. A related problem is the limited capacity to handle NCDs. A major set of organizational problems concerns separation of administration, curative and preventive services, as well as between levels, making sharing of limited staff resources and coordination more difficult. Another major problem is the limited staff capacity. In part this is caused by weak pre-service and in-service training, but also because of lack of procedures, standards, monitoring and inspection. Staff pay is low, causing low staff motivation, in particular as cost of living has been rising rapidly. Most staff need a second job. All these supply problems will affect the quality of services and management of important infections.

44. Spending on drugs increased rapidly after facilities were allowed to charge for drugs, and later also use drug revolving funds, and is now reaching 40% of total health spending, much of this out pocket which is the worst way to pay for medical expenditures.⁵ Restrictions on the sale of antibiotics and good practice on limiting the use of antibiotics for bacterial infections are not being followed, thereby contributing to drug resistance. The trade in substandard and fake drugs, in particular for malaria and bacterial infections, is a global risk.

e. Health Information System (HIS)

45. The Government issues an annual report on the health sector in Myanmar which has core information on sector statistics, organization, policies, programs and financing.⁶ Various other reports are available, notably of the United Nations agencies and the World Bank. These highlight the major transformation that has taken place in recent years in the health sector, which for many years suffered from very low government spending, and thus has a long way to recovery. However, this transformation has not been captured in health statistics, possibly because it takes time to increase staff and for inputs to translate in activities, coverage and impact. Another problem is that data may have been unreliable. Remote population with poor health are not captured in statistics, e.g., birth registration covers about 72% of births.

46. HIS is one of twelve programs under the National Health Plan. Hospital information, public health information, human resource information, logistic information and information communication technology development are projects under this HMIS program. According to the Health Information System Strategic Plan (2011-2015), the vision is “a simple, effective and systematic health information system (HIS) established at all levels of health care delivery for the strengthening of health system”. The general objective is to improve the availability, accessibility and utilization of quality health information. Specific objectives are (i) to enhance the HIS commitment, coordination and resources; (ii) improve the quality of the hospital data recording and reporting; (iii) improve the quality of the public health data recording and reporting; (iv) to develop a reporting system for the private health sector; (v) to improve the

⁵ The poor are expected to be provided free health care, to be elaborated in a section on poverty and financing.

⁶ Ministry of Health, The Republic of the Union of Myanmar. *Health in Myanmar 2014*.

coverage and quality of vital registration system; (vi) to improve surveillance system on disease and health; (vii) to encourage population based survey; (viii) to improve data management, and data sharing encompassing IT development; and (ix) to promote utilization of health information in decision making process.

47. The Health Information System is in place, connecting public health facilities. An assessment of the HIS in 2010 concluded as follows: all resources (policy and plans, staff, financing) present but not adequate, indicators adequate, data sources: census not functional, vital statistics adequate (except capacity and practices), surveys adequate except dissemination, health and disease records present but not adequate, health services records present but not adequate in particular in content, administrative records present but inadequate in particular in integration. Data management was also considered inadequate, and information products generally adequate with scope for improvement in terms of consistency and other criteria.

48. Based on the annual report of statistics of public hospitals in Myanmar for 2010 and 2011, nil reporting was found in 8.8 % of public hospitals in 2010 and 10.3 % of those in 2011. Full response rates were found in 80.2 % and 78.9 % of public hospitals in 2010 and 2011 respectively. Kayin State had 100 % reporting in 2010 and 89.6 % in 2011. In 2011, the highest reporting status was found in Chin State and Lowest in Shan (north).

49. Further improvement is needed in terms of completeness and accuracy of reporting, expansion to the private sector, linkages of reporting and surveillance systems, and using information for decision making at all levels. Internet connectivity will take time to expand, so mobile phone reporting may be an option. While 80% of youth have mobile phones and texting is higher among poor rural youth, most reporting at commune level is with paper.

50. Based on a 2012 evaluation, Myanmar's malaria surveillance system works fairly well for its current purpose, which is reporting malaria cases from village level upwards, for the first part using paper-based reporting, then entering data in spreadsheets for onwards reporting. However, data entry is difficult due to use of an outdated excel spreadsheet, large volume of information, poor connectivity, and staff constraints, and use of data is also insufficient. Further computerization is needed, but a priority is to introduce more user friendly software at township level. Individual case reporting and real time response capacity is needed to upgrade the system for pre-elimination and control of artemisinin resistance.

f. Financing

51. Following Typhoon Nargis in 2008, support from international partners rapidly increased, but aid could not be channeled through the government system because of economic sanctions. UN agencies, international and community NGOs, and community-based organizations were contracted to provide services for priority programs, in particular HIV/AIDS, malaria and tuberculosis, and gradually also more support for MNCH. Evaluation reports show that much of this aid was relevant, effective and efficient, despite some major administrative hurdles that had to be overcome. Partners were also pragmatic. For example, as the GF moved back in 2012, the 3MDG fund switched to support MNCH.

52. However, there are some major concerns with the current state of affairs. Current aid still only constitutes 10% of total spending on health services, and several major partners have announced to want to scale down or exit the sector in Myanmar. Second, funds are not transparent and channeled outside the government budget. Third, financing NGO services did

not help to build up government capacity, while delivery costs were probably much higher than in the Government system. At the same time, it is unlikely that government services, being tied to standard salaries and other constraints, would have had the flexibility to deliver services where unit costs are much higher, in remote areas. The fear is that much of this developed capacity in NGOs will be lost, services will decline, and indicators will worsen. Perhaps this is a good time to consider whether the Government should expand its role as a provider of health services, take over NGOs, or consider alternative provider mechanisms, such as management agreements, contracting out and public private partnership.

53. Myanmar's overall health expenditure has increased to about 2% of GDP, about \$35 per capita. About 20% is public spending and external aid. Much of aid is extra budgetary. Government spending on health is estimated at 4% of total public spending, a major increase as it was below 1% for many years. About 80% of health spending is out of pocket, for both public and private services. In terms of impact on health and poverty, this is the worst form of health spending. The Government plans to increase the level of financing, range of benefits, and coverage of social security.

54. Most of Government spending on health is for hospitals, some 68%, and 17% is spend on ambulatory care, implying excess hospitalization. Spending on programs is extremely low at about 3% as this is mainly funded by partners outside the budget. Spending on investment and non-wage expenditures is relatively high compared to spending on wages. Low public sector pay is exacerbating chronic problems in retaining qualified health workers in the public sector. This raises major concerns about sustainability of disease control programs such as for HIV/AIDS control, which has a commitment to care for current patients on ART, while a large number of patients who need treatment cannot enroll and may have no choice but to go to Thailand.

55. Major concerns of partners to channel funds through the government system are lack of transparency, and limited procurement and financial management capacities. The Government is making effort to improve transparency by publishing reports, but basic data are not yet accessible and audits are internal. Myanmar has a long tradition of administration, so compared to other countries like the Lao PDR, should be able to quickly improve its procurement and financial management capacities. The World Bank has started channeling funds through the government system using both World Bank and Government guidelines, with promising progress.

Appendix 2 : GMS HEALTH SECURITY PROJECT

CAMBODIA, LAOS, MYANMAR, VIET NAM

MYANMAR IHR/APSED ASSESSMENT

STRATEGIC AREA: 1.1.1 Legislation, laws, regulations, administrative requirements, policies or other government instruments in place are sufficient for implementation of IHR		
	Question	Progress/Problems
	1.1.1.1 Has an assessment of relevant legislation, regulations, administrative requirements and other government instruments for IHR implementation been carried out?	Assessment of fit with constitution and national policies and plans was done for adopting IHR in 2005
	1.1.1.2 Have recommendations following assessment of relevant legislation, regulations, administrative requirements and other government instruments been implemented?	No specific recommendations
	1.1.1.3 Has a review of national policies to facilitate IHR NFP functions and IHR technical core capacities been carried out?	Yes, for approval of Myanmar committing to IHR, legal review was carried out
	1.1.1.4 Have policies to facilitate IHR NFP core and expanded functions and to strengthen core capacities been implemented?	IHR activities have been implemented
	1.1.1.5 Are key elements of national/domestic IHR-related legislation published?	Not published

STRATEGIC AREA: 2.1.1 A functional mechanism is established for the coordination of relevant sectors in the implementation of IHR		
	Question	Progress/Problems
	2.1.1.1 Is there coordination within relevant ministries on events that may constitute a public health event or risk of national or international concern?	National Disaster Preparedness Central Committee and National Disaster Management Working Committee and Subcommittee for Health
	2.1.1.2 Are Standard Operating Procedures (SOP) or equivalent available for coordination between IHR NFP and relevant sectors?	Not specific for IHR but for any emergency
	2.1.1.3 Is a multi-sectoral, multidisciplinary body, committee or taskforce in place addressing IHR requirements on surveillance and response for public health emergencies of national and international concern?	National Disaster Preparedness Central Committee and National Disaster Management Working Committee and Subcommittee for Health
	2.1.1.4a Have multisectoral and multidisciplinary coordination and communication mechanisms been updated regularly?	Telephone numbers and email addresses were available and updated
	2.1.1.4b Have multisectoral and multidisciplinary coordination and communication mechanisms been tested through exercises or through the occurrence of an actual event?	The mechanisms have been tested through the responses made to the actual events.
	2.1.1.5 Have action plans been developed to incorporate lessons learnt of multisectoral and multidisciplinary coordination and communication mechanisms?	The SOPs includes coordination and communication mechanism.
	2.1.1.6 Are annual updates conducted on the status of IHR implementation to stakeholders across all	Annual review meetings have been conducted.

	relevant sectors?	
	2.1.2.1 Has the IHR NFP been established?	Established since 2005.
	2.1.2.2 Does the IHR NFP provide WHO with updated contact information and annual confirmation of the IHR NFP?	Yes, in fact WHO helps collect information from state/region level
	2.1.2.3 Have any additional roles and responsibilities for the IHR NFP functions been implemented?	Strong coordination exists in implementation (including facilitation of funding provision) and communication.
	2.1.2.4 Have functions of the IHR-NFP been evaluated for effectiveness (e.g. empowerment, timeliness, transparency, appropriateness of communication)?	Evaluated in the national annual review and in some regional workshops
	2.1.2.5 Have national stakeholders responsible for the implementation of IHR been identified?	Yes, as part of disaster preparedness
	2.1.2.6 Has information on obligations of the IHR NFP under the IHR been disseminated to relevant national authorities and stakeholders?	The IHR (2005) was disseminated within MOH and states/regional health offices informed about NFP and their obligations.
	2.1.2.7a Have the roles and responsibilities of relevant authorities and stakeholders in regard to IHR implementation been defined?	Military has been identified as responsible for chemical and radiation emergencies.
	2.1.2.7b Have the roles and responsibilities of relevant authorities and stakeholders in regard to IHR implementation been disseminated?	To some level
	2.1.2.8 Have plans to sensitize stakeholders to their roles and responsibilities been implemented?	Sensitization was done within MOH.
	2.1.2.9 Is the IHR Event Information Site used as an integral part of the IHR NFP information resource?	Info from EIS has been shared with relevant sectors by IHR NFP.
	2.1.2.10 Has an active IHR website or webpage been established?	Central Epidemiology Unit website

STRATEGIC AREA: 3.1.1 Indicator-based surveillance includes an early warning function for the early detection of a public health event		
	Question	Progress/Problems
	3.1.1.1 Is there a list of priority diseases, conditions and case definitions for surveillance?	Yes 17 diseases. Training is needed.
	3.1.1.2 Is there a specific unit(s) designated for surveillance of public health risks?	Surveillance unit established at CEU and State/Region Health Office with focal point at district level.
	3.1.1.3 Are surveillance data on epidemic prone and priority diseases analyzed at least weekly at national and sub-national levels?	WHO helps collecting at state/regional level and analyze at national level:
	3.1.1.4 Have baseline estimates, trends, and thresholds for alert and action been defined for the community /primary response level for priority diseases/events?	Alert threshold is calculated
	3.1.1.5 Is there timely reporting from at least 80% of all reporting units?	Data is sent on time from state/region level but not always complete. Quality needs to be improved.
	3.1.1.6 Are deviations or values exceeding thresholds detected and used for action at the primary public health response level?	Yes, for further evaluation and risk assessment
	3.1.1.7 Has regular feedback of surveillance results been disseminated to all levels and other relevant stakeholders?	Weak in providing feedback
	3.1.1.8a Have evaluations of the early warning	National evaluation has been conducted by

	function of the indicator based surveillance been carried out?	WHO.
	3.1.1.8b Have country experiences, findings, lessons learnt on indicator based surveillance been shared with the global community?	Progress has been shared in meetings of WHO, ADB, MBDS, USAID, TEPHINET, etc.

STRATEGIC AREA: 3.2.1 Event-Based Surveillance is established and functioning		
	Question	Progress/Problems
	3.2.1.1 Has a unit(s) responsible for event-based surveillance [31] been identified?	Central Epidemiology Unit in Department of Public Health
	3.2.1.2 Are country SOPs and/or guidelines for event based surveillance available?	There was a simple instruction on how to use the EBS system.
	3.2.1.3 Have SOPs and guidelines for event capture, reporting, confirmation, verification, assessment and notification been implemented?	The SOP is not available, however staffs are familiar with the processes and requirements of EBS.
	3.2.1.4 Have information sources for public health events and risks been identified?	The hotline (free) has been set up to capture all the public health events. Posters on the hotline need to be distributed. Media monitoring was conducted, however there no more fund to support this activity.
	3.2.1.5 Is there a system or mechanism in place at national and/or sub-national levels for capturing public health events from a variety of sources?	Available only at National level and Sub-national. Need to review the EBS data management.
	3.2.1.6 Is there active engagement and sensitization of community leaders, networks, health volunteers, and other community members on the detection and reporting of unusual health events?	Health staff are aware about the hotline but communities insufficiently engaged except in small projects.
	3.2.1.7 Has the community/primary response level reporting been evaluated and updated as needed?	To evaluate at village level
	3.2.1.8a Are country experiences and findings on implementation of event-based surveillance, and the integration with indicator based surveillance documented?	Not yet.
	3.2.1.8b Are country experiences and findings on implementation of event-based surveillance, and the integration with indicator based surveillance, shared with the global community?	To the extent information is available
	3.2.1.9 Are there arrangements with neighboring countries to share data on surveillance and the control of public health events that may be of international concern?	Yes, through WHO, MBDS, and ADB-GMS project via email and workshops and ASEAN FETN
	3.2.1.10 Is the decision instrument in Annex 2 of the IHR used to notify WHO?	Who is partner in surveillance and response system
	3.2.1.11 Have all of events that meet the criteria for notification under Annex 2 of IHR been notified by the IHR NFP to WHO within 24 hours of conducting risk assessments over the last 12 months?	The events are informally consulted to WHO country office very quickly (less than 24h). However, formal IHR notification was made within 24 hours after the assessment (field investigation).
	3.2.1.11b If No, what % of events that meet the criteria for notification under Annex 2 of IHR has been notified by the IHR NFP to WHO within 24 hours of conducting risk assessments over the last 12 months	na
	3.2.1.12 Have all events identified as urgent within the last 12 months been assessed within 48 hours	No, not possible due to logistic and security constraints but most were investigated by district

	of reporting?	health office within 48 hours
	3.2.1.12b If No, what % of events identified as urgent within the last 12 months have been assessed within 48 hours of reporting?	Perhaps 90%
	3.2.1.13 Has the IHR NFP responded to all verification requests from WHO within 24 hours in the last 12 months?	yes
	3.2.1.13b If No, what % of verification requests from WHO has the IHR NFP responded to within 24 hours in the last 12 months?	na
	3.2.1.14a Has the use of the decision instrument been reviewed?	no
	3.2.1.14b Have the procedures for decision making been updated on the basis of lessons learnt?	no
	3.2.1.15a Are country experiences and findings in notification and use of Annex 2 of the IHR documented?	Presented through formal regional and international meetings.
	3.2.1.15b Are country experiences and findings in notification and use of Annex 2 of the IHR shared globally?	Presented through formal regional and international meetings.

STRATEGIC AREA: 4.1.1 Public health emergency response mechanisms are established and functioning		
	Question	Progress/Problems
	4.1.1.1 Are resources for rapid response during public health emergencies of national or international concern accessible?	Resources are available from Government and WHO but are insufficient for major outbreak control.
	4.1.1.2 Have public health emergency response management procedures been established for command, communications and control during public health emergency response operations?	Procedures in place but need to prepare SOPs.
	4.1.1.3 Is there a functional, dedicated command and control operations center in place?	Yes, CEU meeting room functions as war room but lacks telecommunication equipment.
	4.1.1.4 Have emergency response management procedures (including mechanism to activate response plan) been implemented for a real or simulated public health response in the last 12 months?	Yes, for flood related assistance, dengue outbreak, and suspected Ebola virus infection.
	4.1.1.5a Have emergency response management procedures (including mechanism to activate response plan) been evaluated after a real or simulated public health response?	EHF simulation exercise was conducted.
	4.1.1.5b Have emergency response management procedures been updated after a real or simulated public health response?	Not officially
	4.1.1.6 Are there Rapid Response Teams (RRTs) to respond to events that may constitute a public health emergency?	RRTs are in place at state/region and district levels, and in larger townships.
	4.1.1.7 Are there SOPs and/or guidelines available for the deployment of RRT members?	Instructions for RRT was provided, including SOPs how to handle emergencies.
	4.1.1.8 Have staff been trained (including RRT members) been trained in specimen collection and transport?	RRTs were given training with support of WHO for risk analysis, investigation, and transportation of victims and specimen.
	4.1.1.9 Are there case management guidelines for priority conditions?	Available guidelines for AI, SARS/MERS type, EHF, Cholera and other diarrheal diseases,

		Dengue
	4.1.1.10 Are evaluations of response (including the timeliness and quality of response) systematically carried out?	Only for major public health threats.
	4.1.1.11 Can multidisciplinary RRT be deployed within 48 hrs from the first report of an urgent event?	RRTs can be deployed of security and logistics permit. Cash flow is problem but WHO provides support.
	4.1.1.12 Has the country offered assistance to other States Parties for developing their response capacities or implementing control measures?	ASEAN joint outbreak investigation and response (FETN).

STRATEGIC AREA: 4.2.1 Infection Prevention and Control (IPC) is established and functioning at national and hospital levels

	Question	Progress/Problems
	4.2.1.1 Has responsibility been assigned for surveillance of health-care-associated infections within the country?	Focal point for IPC in Department of Medical Services and National Health Laboratory
	4.2.1.2 Has responsibility been assigned for surveillance of anti-microbial resistance within the country?	As above
	4.2.1.3 Is a national infection prevention and control policy or operational plan available?	Yes, based on WHO plan
	4.2.1.4 Are SOP's, guidelines and protocols for IPC available to hospitals?	General IPC guidelines, injection safety guidelines are available, however only some SOPs are available (e.g. hand hygiene, PPE for droplet precautions, SOPs for IV, SC, IM injections...)
	4.2.1.5 Do all tertiary hospitals have designated area(s) and defined procedures for the care of patients requiring specific isolation precautions according to national or international guidelines?	Tertiary hospitals have been assessed to have designated area to isolate patient, but most not yet up-to-standards.
	4.2.1.6 Are there qualified IPC professionals in place in all tertiary hospitals?	A few professionals available in some selected national-level hospitals.
	4.2.1.7 Are defined norms or guidelines developed for protecting health-care workers?	Small paragraph in the IPC policy, and some information in the general IPC guidelines
	4.2.1.8 Have infection control plans been implemented nationwide?	The plan is being implemented in all state/region hospitals, not all activities are implemented.
	4.2.1.9 Is there surveillance within high risk groups [48] to promptly detect and investigate clusters of infectious disease patients, as well as unexplained illnesses in health workers?	No routine surveillance system is in place but the DMS is informed of any events.
	4.2.1.10 Are infection control measures and the effectiveness regularly evaluated and published?	QA is supposed to be conducted once per year with WHO, include the 6 IPC standard precautions. Unknown if this happened, nothing published.
	4.2.1.11 Has a monitoring system for antimicrobial resistance been established?	Ad hoc based monitoring is available only at NHL.
	4.2.1.12a Has a functional monitoring system for antimicrobial resistance been implemented?	A functional monitoring system needs to be established
	4.2.1.12b Are data available on the magnitude and trends of antimicrobial resistance?	As above. Lab data is available but fragmented and not aggregated on national scale.
	4.2.1.13 Has a national program for protecting health care workers been implemented?	Immunization (Hep B) for health care workers is available in some provinces. Vaccines for Hepatitis B and Influenza, and PPE must be

	acquired. Health Care Workers to be considered as a target group for vaccination.
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STRATEGIC AREA: 5.1.1 Multi-hazard National Public Health Emergency Preparedness and Response Plan is developed and implemented

	Question	Progress/Problems
	5.1.1.1 Has an assessment] of the capacity of existing national structures and resources to meet IHR core capacity requirements been conducted?	Assessment for natural hazards was conducted as a part of planning process of for Disaster Management
	5.1.1.2 Has a national plan to meet the IHR core capacity requirements been developed?	MOH has plan to implement IHR Minimum Core Capacity and APSED Priority areas.
	5.1.1.3 Does the national public health emergency response plan incorporate IHR related hazards and PoE?	IHR falls under umbrella of disaster management but linkages to be clarified
	5.1.1.4a Have national public health emergency response plan(s) been implemented/tested in an actual emergency or simulation exercises?	Avian Influenza, suspected Ebola virus infection
	5.1.1.4b Have national public health emergency response plan(s) been updated as needed?	No
	5.1.1.5 Are procedures, plans or strategies in place to reallocate or mobilize resources from national and sub-national levels to support action at community /primary response level?	State/region can make emergency funds available for disasters, there are instructions to this effect.
	5.1.1.6 Have procedures, plans or strategy been implemented to reallocate or mobilize resources from national and sub-national levels to support action at community /primary response level?	National level can make emergency funds available for disasters, there are instructions to this effect.
	5.1.1.7 Have procedures, plans or strategy to reallocate or mobilize resources from national and sub-national levels to support action at community /primary response level been reviewed and updated as needed?	As above
	5.1.1.8 Is surge capacity to respond to public health emergencies of national and international concern available?	There is no surge capacity, nor is there in any other country such as Australia which was fully loaded with a mild swine flu outbreak. In case of real epidemic, international agencies need to come in, but if outbreaks happen in several countries, international agencies will also not be able to handle. Perhaps international military will need to be brought in.
	5.1.1.9 Has the adequacy of surge capacity to respond to public health emergencies of national and international concern been tested through an exercise or actual event (e.g. as part of the response plans)?	Not possible to test surge capacity as there is no surge capacity, but few suspected cases have been handled as event of global health concern. This provided good lessons.
	5.1.1.10a Have country experiences and findings on emergency response and in mobilizing surge capacity, been documented?	No
	5.1.1.10b Have country experiences and findings on emergency response and in mobilizing surge capacity, been shared with the global community?	No

STRATEGIC AREA: 5.2.1 Priority public health risks and resources are mapped and utilized

	Question	Progress/Problems
	5.2.1.1 Is a directory or list of experts in health and	Directory is available in CEU.

	other sectors to support a response to IHR-related hazards available?	
	5.2.1.2 Has a national risk assessment to identify potential urgent public health event, and the most likely sources of these events been conducted?	Risk assessment was conducted for flood
	5.2.1.3 Have national resources been mapped for IHR relevant hazards and priority risks?	To be developed.
	5.2.1.4 Have national profiles on risks and resources been developed?	To be developed.
	5.2.1.5 Is the national risk profile assessed regularly to accommodate emerging threats?	As above
	5.2.1.6 Are the national resources for priority risks assessed regularly to accommodate emerging threats?	As above
	5.2.1.7 Is a plan for management and distribution of national stockpiles available?	There are stockpiles and a fast-track mechanism has been developed to expedite the release of medicines in case of emergencies. PPE, ORS, etc.
	5.2.1.8 Are stockpiles (critical stock levels) accessible for responding to priority biological, chemical, radiological events and other emergencies?	No
	5.2.1.9 Does the country contribute to international stockpiles?	No

STRATEGIC AREA: 6.1.1 Mechanisms for effective risk communication during a public health emergency are established and functioning		
	Question	Progress/Problems
	6.1.1.1 Have risk communication partners and stakeholders been identified?	There is no national IEC Committee for EIDs, but meetings are held recording IEC and media information, last meeting for EHF messages.
	6.1.1.2 Has a risk communication plan been developed?	Pandemic Risk Communication Plan has been drafted with assistance of WHO. A Risk Communications Strategy including SOPs was drafted under approval.
	6.1.1.3 Has the risk communication plan been implemented or tested through actual emergency or simulation exercise and updated in the last 12 months?	The plan has not been implemented. A simulation exercise was conducted with scenario developed for the exercise, but not based on the plan.
	6.1.1.4 Are policies, SOPs or guidelines developed on the clearance and release of information during a public health emergency?	The risk communication practices were documented and written as SOPs, and included in the Risk Communication Strategy
	6.1.1.5 Are regularly updated information sources accessible to media and the public for information dissemination [60]?	Information is shared through interviews and news bulletins, not on website.
	6.1.1.6 Are there accessible and relevant IEC (Information, Education and Communications) materials tailored to the needs of the population?	Some IEC materials are available on specific diseases such as H5N1, H1N1, cholera, SARS/MERS and EHF.
	6.1.1.7 In the last three national or international PH emergencies, have populations and partners been informed of a real or potential risk within 24 hours following confirmation?	Information on Avian Influenza, EHF and MERS were provided to the public and partners.
	6.1.1.8 Has an evaluation of the public health communication been conducted after emergencies, for timeliness, transparency and appropriateness of	Not yet

	communications?	
	6.1.1.9 Have the results of evaluations been used to update risk communication plan?	Not yet
	6.1.1.10 Have results of evaluations of risk communications efforts during a public health emergency been shared with the global community?	Not yet

STRATEGIC AREA: 7.1.1 Human resources available to implement IHR Core Capacity requirements		
	Question	Progress/Problems
	7.1.1.1 Has a unit that is responsible for the development of human resource capacities including for the IHR been identified?	The human resources department is responsible. MOH is revising Human Resource Development Plan
	7.1.1.2 Has a needs assessment been conducted to identify gaps in human resources and training to meet IHR requirements?	Health Work Force Management Division and CEU
	7.1.1.3 Does a workforce development or training plan that includes human resource requirements for IHR exist?	Not yet, in process of revising Human Resource for Health Development Plan, unsure if specific IHR requirements are being considered
	7.1.1.4 Is progress for meeting workforce numbers and skills consistent with milestones set in the training plan?	Not yet except for FETP
	7.1.1.5 Has a plan or strategy been developed to access field epidemiology training (one year or more) in-country, regionally or internationally?	FETP program has been put in place, including short course for training of assistant field epidemiologists
	7.1.1.6 Has the plan or strategy to access field epidemiology training (one year or more) in-country, regionally or internationally been implemented?	Yes, in process, facilities are too small and need upgrading.
	7.1.1.7 Are there specific programs, with allocated budgets, to train workforces for IHR-relevant hazards?	Yes, for training courses.

STRATEGIC AREA: 8.1.1 Laboratory services available to test for priority health threats		
	Question	Progress/Problems
	8.1.1.1 Is there a policy to ensure the quality of laboratory diagnostic capacities (e.g. licensing, accreditation, etc.)?	Policy in place and draft national laboratory plan pending approval but inadequately covers quality assurance, audit, licensing and accreditation
	8.1.1.2 Are national laboratory quality standards/guidelines available?	Based on WHO standards
	8.1.1.3 Does your country have access to networks of international laboratories to meet diagnostic and confirmatory laboratory requirements, and support outbreak investigations for events specified in Annex 2 of IHR?	Yes, many including USA/CDC, France (Pasteur), Japan, Korea, Thailand, Singapore, Malaysia, India.
	8.1.1.4 Is there national laboratory capacity to meet diagnostic and confirmatory laboratory requirements for priority diseases?	A list of laboratory tests in reference (NHL) and partner-supported laboratories (Pasteur, NAMRU-2) have been developed. A list of laboratory-reportable diseases to be developed and disseminated.
	8.1.1.5a Is an up to date inventory of public and private laboratories with relevant diagnostic capacity available?	WHO prepares information on the diagnostic capacity of reference, partner-supported, and national and state/region laboratories that have microbiology diagnostic. No inventory of private laboratories.
	8.1.1.5b Is the inventory of public and private laboratories accessible?	See above.

8.1.1.6	Do national reference laboratories participate successfully in External Quality Assessment schemes for major public health disciplines for diagnostic laboratories?	NHL participates in EQA programs for HIV, malaria, TB, perhaps general microbiology. NHL not involved BSL3 level work.
8.1.1.7	Are more than 10 non-AFP (Acute Flaccid Paralysis) hazardous specimens per year referred to national reference laboratories for examination?	Arranged with support of WHO to be send to international referral laboratory.
8.1.1.8	Are all national reference laboratories accredited to international standards or to national standards adapted from international standards?	NHL is not accredited according to international or national standards. However, NHL is certified for specific diseases.
8.1.1.9	Are national regulations compatible with international guidelines implemented for the packaging and transport of clinical specimens?	The IATA guidelines for specimen transportation to reference labs overseas are followed. There are no national regulations or guidelines for packaging and transportation of infectious substances. Domestic national regulations compatible with the international ones need to be developed.
8.1.1.10	Is there a functional system for collection, packaging and transport of clinical specimens?	This system is used regularly for disease surveillance. It is also used for outbreak response, but it does not comply with international biosafety regulations.
8.1.1.11	Have sample collection and transportation kits been pre-positioned at appropriate levels for immediate mobilization during a PH event?	Yes, kits (e.g. ice box, etc.) are available at the state/region level but maybe not for food and water born infections.
8.1.1.12	Has staff at national or relevant levels been trained for the safe shipment of infectious substances according to international standards (ICAO/IATA)?	CEU staff received training in safe shipment of infectious substances according to IATA standards.
8.1.1.13	Do the processes for shipment of infectious substances when investigating an urgent public health event consistently meet ICAO/IATA standards?	International shipment of infectious substances consistently meets IATA standards, but domestic shipment does not meet IATA standards. Domestic standards for packaging and ground transportation of infectious substances need to be developed.
8.1.1.14	Can clinical specimens from investigation of urgent public health events be delivered for testing to appropriate national or international reference laboratories within the appropriate timeframe [70] of collection?	Yes, specimens have been delivered in time. To various international agencies.
8.1.1.15	Have at least 10 hazardous specimens per year been shipped internationally to a collaborating laboratory as part of an investigation or exercise?	No.

STRATEGIC AREA: 8.2.1 Laboratory biosafety and laboratory biosecurity (Bio risk management) practices in place and implemented

	Question	Progress/Problems
8.2.1.1	Are biosafety guidelines accessible to laboratories?	Guidelines have been drafted and will be revised during a consultation meeting in July 2015.
8.2.1.2	Are regulations, policies or strategies for laboratory biosafety available?	WHO guidelines used
8.2.1.3	Has a responsible entity been designated for laboratory biosafety and laboratory biosecurity?	The TOR for a national laboratory biosafety committee have been drafted but not finalized.
8.2.1.4	Are relevant staff trained in laboratory biosafety and laboratory biosecurity guidelines?	Several staff have been trained based on international guidelines, but training has not been translated into improvements in laboratory biosafety.

8.2.1.5 Has an institution or person responsible for inspection (could include certification of biosafety equipment) of laboratories for compliance with biosafety requirements been identified?	An inspection authority has not been identified.
8.2.1.6 Has a bio risk assessment been conducted in laboratories to guide and update biosafety regulations, procedures and practice, including decontamination and management of infectious waste?	Planned for 2016 because of limited capacity in the country.
Please provide the URL link(s) to any relevant documentation: Link/url	NHL
Please insert any comments or clarifications to the questions above and list any relevant activities that the country has conducted which are not reflected in this questionnaire.	Assessment of the laboratory identified biosafety as one of the major problems in laboratories in Myanmar.

STRATEGIC AREA: 9.1.1 General obligations at PoE are fulfilled (including for coordination and communication)		
	Question	Progress/Problems
	9.1.1.1 Have priority conditions for surveillance at designated PoE been identified?	For airports
	9.1.1.2 Has surveillance information at designated PoE been shared with the surveillance department/unit?	For airports
	9.1.1.3 Has a review meeting (or other appropriate method) to designate PoE been held?	International airports, ports and land crossings are designated
	9.1.1.7 Has a list of ports to offer ship sanitation certificates been sent to WHO? If no, please send a list of authorized ports and include the ISO, LOCODE, SSCC, SSCEC and Extension for each designated PoE via email to ihrpag@who.int or fax to+41227914667.	No
	9.1.1.8 Have relevant legislation, regulations, administrative acts, protocols, procedures and/or other government instruments to facilitate IHR implementation at designated PoE been updated as needed?	The roles and responsibilities of concerned stakeholders at points of entry was developed and endorsed. SOPs to respond EHF and MERS were developed and endorsed. Sub decree for prevention and response to infectious diseases at borders are under process of approval.
	9.1.1.9 Have updated IHR health documents been implemented at designated PoE(s)?	All the concerned Annexes of IHR was distributed to the designated POEs.
	9.1.1.10 Have designated PoE been assessed?	No
	9.1.1.14 Are mechanisms for the exchange of information between designated PoE and medical facilities in place?	Yes
	9.1.1.15a Are procedures in place for coordination and communication between the IHR NFP and the PoE competent authority and with relevant sectors and levels?	Yes
	9.1.1.15b Have procedures for coordination and communication between the IHR NFP and the PoE competent authority and with relevant sectors and levels been tested?	Event experiences
	9.1.1.16a Have procedures for communication internationally between the PoE competent authority and other countries' PoE competent authorities been	Sharing information through neighboring provinces through email, phone or note but not standardized.

	tested?	
	9.1.1.16b Have procedures for communication internationally between the PoE competent authority and other countries' PoE competent authorities been updated as needed?	No
	9.1.1.17 Have bilateral or multilateral agreements or arrangements concerning prevention or control of international transmission of disease at designated PoE been established?	MBDS MOU, bilateral agreements with Thailand and China.

STRATEGIC AREA: 9.2.1 Routine capacities and effective surveillance are established at PoE		
	Question	Progress/Problems
	Ports 9.2.1.1 Please indicate the number of designated PoE (by type) that have access to appropriate medical services including diagnostic facilities for the prompt assessment and care of ill travelers and with adequate staff, equipment and premises	None
	Airports 9.2.1.1 Please indicate the number of designated PoE (by type) that have access to appropriate medical services including diagnostic facilities for the prompt assessment and care of ill travelers and with adequate staff, equipment and premises	Yangon airport
	Ground Crossings 9.2.1.1 Please indicate the number of designated PoE (by type) that have access to appropriate medical services including diagnostic facilities for the prompt assessment and care of ill travelers and with adequate staff, equipment and premises	No ground crossing is officially designated
	Ports 9.2.1.2 Please indicate the number of designated PoE (by type) that can provide access to equipment and personnel for the transport of ill travelers to an appropriate medical facility	None
	Airports 9.2.1.2 Please indicate the number of designated PoE (by type) that can provide access to equipment and personnel for the transport of ill travelers to an appropriate medical facility	Yangon and Mandalay airports,
	Ground Crossings 9.2.1.2 Please indicate the number of designated PoE (by type) that can provide access to equipment and personnel for the transport of ill travelers to an appropriate medical facility	None
	Ports 9.2.1.3 Please indicate the number of designated PoE (by type) that have an inspection program to ensure safe environment at facilities is functioning Including potable water supplies, eating establishments, flight catering facilities, public washrooms, appropriate solid and liquid waste disposal services and other potential risk are, as appropriate	None

Airports 9.2.1.3 Please indicate the number of designated PoE (by type) that have an inspection program to ensure safe environment at facilities is functioning Including potable water supplies, eating establishments, flight catering facilities, public washrooms, appropriate solid and liquid waste disposal services and other potential risk are, as appropriate	None
Ground Crossings 9.2.1.3 Please indicate the number of designated PoE (by type) that have an inspection program to ensure safe environment at facilities is functioning	None
Ports 9.2.1.4 Please indicate the number of designated PoE (by type) that have a functioning program for the surveillance and control of vectors and reservoirs in and near Points of Entry	None
Airports 9.2.1.4 Please indicate the number of designated PoE (by type) that have a functioning program for the surveillance and control of vectors and reservoirs in and near Points of Entry	None
Ground Crossings 9.2.1.4 Please indicate the number of designated PoE (by type) that have a functioning program for the surveillance and control of vectors and reservoirs in and near Points of Entry	None
Ports 9.2.1.5 Please indicate the number of designated PoE (by type) that have trained personnel for the inspection of conveyances	Quarantine officers in major ports.
Airports 9.2.1.5 Please indicate the number of designated PoE (by type) that have trained personnel for the inspection of conveyances	Quarantine officers in international airports
Ground Crossings 9.2.1.5 Please indicate the number of designated PoE (by type) that have trained personnel for the inspection of conveyances	Quarantine officers in major international border crossings
9.2.1.6a Has a review of surveillance of health threats at designated PoE been carried out in the last 12 months?	No
9.2.1.6b Have results from review of surveillance of health threats at designated PoE been published?	No

STRATEGIC AREA: 9.3.1 Effective response at PoE is established		
	Question	Progress/Problems
	9.3.1.1 Are SOPs for response at designated PoE available?	Yes, instructions for handling of suspected cases.
	Ports 9.3.1.3 Please indicate the number of designated PoE (by type) that have public health emergency contingency plans tested and updated as needed	The plan has to be finalized first and to be tested.
	Airports 9.3.1.3 Please indicate the number of designated PoE	The SOPs for EHF were tested

	(by type) that have public health emergency contingency plans tested and updated as needed	
	Ground Crossings 9.3.1.3 Please indicate the number of designated PoE (by type) that have public health emergency contingency plans tested and updated as needed	To be done
	Ports 9.3.1.4 Please indicate the number of designated PoE (by type) that have appropriate space, separate from other travelers, to interview suspect or affected persons	Not known
	Airports 9.3.1.4 Please indicate the number of designated PoE (by type) that have appropriate space, separate from other travelers, to interview suspect or affected persons (Annex 1B, 2c)	All international airports
	Ground Crossings 9.3.1.4 Please indicate the number of designated PoE (by type) that have appropriate space, separate from other travelers, to interview suspect or affected persons	Not known
	Ports 9.3.1.5 Please indicate the number of designated PoE (by type) that can provide medical assessment or quarantine of suspect travelers, and care for affected travelers or animals by establishing arrangements with local medical and veterinary facilities for their isolation, treatment and other support services that may be required.	Major international crossings only
	Airports 9.3.1.5 Please indicate the number of designated PoE (by type) that can provide medical assessment or quarantine of suspect travelers, and care for affected travelers or animals by establishing arrangements with local medical and veterinary facilities for their isolation, treatment and other support services that may be required.	All international airports
	Ground Crossings 9.3.1.5 Please indicate the number of designated PoE (by type) that can provide medical assessment or quarantine of suspect travelers, and care for affected travelers or animals	Not known
	Ports 9.3.1.6 Please indicate the number of designated PoE (by type) that can apply entry or exit controls for arriving and departing travelers and other recommended public health measures Include entry or exit controls for arriving and departing travelers, and measures to decontaminate or otherwise treat baggage, cargo, containers, conveyances, goods or postal parcels including, when appropriate, at locations specifically designated and equipped for this purpose.	All major ports are supposed to do this but doubtful if much is done
	Airports 9.3.1.6 Please indicate the number of designated PoE (by type) that can apply entry or exit controls for	All international airports

	arriving and departing travelers and other recommended public health measures	
	Ground Crossings 9.3.1.6 Please indicate the number of designated PoE (by type) that can apply entry or exit controls for arriving and departing travelers and other recommended public health measures	All major international land border crossings
	Ports 9.3.1.7 Please indicate the number of designated PoE (by type) that have access to specially designated equipment, and to trained personnel (with appropriate personal protection), for the transfer of travelers who may carry infection or contamination available at designated PoE	Not known
	Airports 9.3.1.7 Please indicate the number of designated PoE (by type) that have access to specially designated equipment, and to trained personnel (with appropriate personal protection), for the transfer of travelers who may carry infection or contamination available at designated PoE	All international airports have some equipment and trained staff
	Ground Crossings 9.3.1.7 Please indicate the number of designated PoE (by type) that have access to specially designated equipment, and to trained personnel (with appropriate personal protection), for the transfer of travelers who may carry infection or contamination available at designated PoE	Not known
	9.3.1.8a Has the effectiveness of response to PH events at PoE been evaluated?	There was a case under investigation for EHF.
	9.3.1.8b Are results of the evaluation of effectiveness of response to PH events at PoE published?	To be done.
	Please provide the URL link(s) to any relevant documentation: Link/url	
	Please insert comments or list any activities that the country has conducted at designated Points of Entry, and that are not reflected in this questionnaire.	Roles and responsibilities for managing POE need to be clarified among ministries.
	Kindly mention the assessment of any designated PoE and the tools used to conduct the assessment:	

STRATEGIC AREA: 10.1.1 Mechanisms for detecting and responding to zoonoses and potential zoonoses are established and functional

	Question	Progress/Problems
	10.1.1.1 Does coordination exist within the responsible government authorities for the detection of and response to zoonotic events?	An Inter-ministerial committee is in place.
	10.1.1.2 Is there a national policy, strategy or plan in place for the surveillance and response to zoonotic events?	For animal health
	10.1.1.3 Have focal points responsible for animal health (including wildlife) been designated for coordination with the MOH and/or IHR NFP,	Focal points exist for domestic animals and wild life
	10.1.1.4 Have functional mechanisms for intersectoral collaborations that include animal and human health surveillance units and laboratories	Pasteur Institute tests both animal and human specimens. Limited to H5N1.

	been established?	
	10.1.1.5 Is a list of priority zoonotic diseases with case definitions available?	A list of priority diseases is available, with agreed case definitions only for selected diseases (i.e. AI).
	10.1.1.6 Is there systematic and timely collection and collation of zoonotic disease data?	Collection and collation of data is done on an ad-hoc base but not in a systematic way.
	10.1.1.7 Is there timely and systematic information exchange between animal surveillance units, laboratories, human health surveillance units and other relevant sectors regarding potential zoonotic risks and urgent zoonotic events?	Effective information sharing was demonstrated in response to H5N1. Further improvement is needed mainly in other diseases.
	10.1.1.8 Does the country have access to laboratory capacity, nationally or internationally (through established procedures) to confirm priority zoonotic events?	National (NHL, Pasteur), International (Australia/WHO CC, Institute Pasteur Paris, USCDC, FAO and OIE reference laboratories).
	10.1.1.9 Is zoonotic disease surveillance implemented that includes a community component?	Public information using various channels
	10.1.1.10 Is there a regularly updated roster (list) of experts that can respond to zoonotic events?	Needs to be revived
	10.1.1.11 Has a mechanism been established for response to outbreaks of zoonotic diseases by human and animal health sectors?	Limited to H5N1, Rabies
	10.1.1.12 Is there timely (as defined by national standards) response to more than 80% of zoonotic events of potential national and international concern?	Demonstrated (within 24 hours) in AI outbreaks. Further strengthening is required for other priority diseases.
	10.1.1.12b If no, what percentage of zoonotic events of potential national and international concern is responded to in a timely manner?	n/a
	10.1.1.13 In the last 12 months, have country experiences and findings related to zoonotic risks and events of potential national and international concern been shared with the global community?	Through IHR notification, press release and OIE notification for AI

STRATEGIC AREA: 11.1.1 Mechanisms are established and functioning for detecting and responding to foodborne disease and food contamination

	Question	Progress/Problems
	11.1.1.1 Are national or international food safety standards available?	The standards include national food standards for selected food and CODEX and ASEAN standards. CODEX standards are yet to be approved by the government.
	11.1.1.2 Are there national food laws, regulations or policies in place to facilitate food safety control?	Various policies in place on handling food but mostly outdated.
	11.1.1.3a Are national food laws, regulations or policies up to date?	No needs to be updated
	11.1.1.3b Are national food laws, regulations or policies implemented?	There is a major gap in implementation.
	11.1.1.4 Has a coordination mechanism been established between the food safety authorities, e.g. the INFOSAN Emergency Contact Point (if member) and the IHR NFP?	Yes, for AI and Rabies but needs to be broader
	11.1.1.5 Are there functional mechanisms in place for multisectoral collaborations for food safety events?	Yes, when there is an outbreak all ministries cooperate
	11.1.1.6 Is your country an active member of the	Yes

	INFOSAN network?	
	11.1.1.7 Is a list of priority food safety risks available?	A list of high-risk food is available but not properly disseminated.
	11.1.1.8 Are guidelines or manuals on the surveillance, assessment and management of priority food safety events available?	To be developed.
	11.1.1.9 Have the guidelines or manuals on the surveillance, assessment and management of priority food safety events been implemented?	To be developed.
	11.1.1.10 Have surveillance, assessment and management of priority food safety events been evaluated and relevant procedures updated as needed?	No
	11.1.1.11 Is epidemiological data related to food contamination systematically collected and analyzed?	To be developed.
	11.1.1.12 Are there risk-based food inspection services in place?	Samples are being collected from markets, shops and restaurants for testing.
	11.1.1.13 Does the country have access to laboratory capacity (through established procedures) to confirm priority food safety events of national or international concern including molecular techniques?	Yes, but lack of toxicology equipment Can analyze pesticides, food preservatives plus melamine and T-PCD. Other ministries may also have food safety labs. Access to international reference labs (Viet Nam, Thailand, Singapore, which are ASEAN Reference Laboratories, and France, etc.) China lab for testing agricultural products
	11.1.1.14 Is there timely and systematic information exchange between food safety authorities, surveillance units and other relevant sectors regarding food safety events?	Coordination is not systematic and can be improved
	11.1.1.15 Is there a roster of food safety experts for the assessment and response to food safety events?	Not known.
	11.1.1.16 Have operational plan(s) for responding to food safety events been implemented?	SOPs for food borne disease outbreak drafted
	11.1.1.17a Have operational plan(s) for responding to food safety events been tested in an actual emergency or simulation exercise?	Yes, based on real outbreaks
	11.1.1.17b Have operational plan(s) for responding to food safety events been updated as needed?	In process
	11.1.1.18 Have mechanisms been established to trace, recall and dispose of contaminated products?	The mechanism is not functioning
	11.1.1.19 Are there communication mechanisms and materials in place to deliver information, education and advice to stakeholders across the farm-to-fork continuum?	There is information sharing using media and brochures to stakeholders but this is ad hoc
	11.1.1.20 Have food safety control management systems (including for imported food) been implemented?	Capacity needs to be improved/the system need to be reformed and law enforcement need to be enforced
	11.1.1.21 Has information from foodborne outbreaks and food contamination been used to strengthen food management systems, safety standards and regulations?	There are limited opportunities for CEU to do this Also lack of human and financial resources
	11.1.1.22 Has an analysis been published of food safety events, foodborne illness trends and outbreaks which integrate data from across the food chain?	The outbreak reports will be shared

STRATEGIC AREA: 12.1.1 Mechanisms are established and functioning for detection, alert and

response to chemical emergencies that may constitute a public health event of international concern		
	Question	Progress/Problems
	12.1.1.1 Have experts been identified for public health assessment and response to chemical incidents?	Chemical, Biological, Radiological, and Nuclear incidents are handled by the Disaster Prevention Central Committee and handled by the Military.
	12.1.1.2 Are national policies or plans in place for chemical event surveillance, alert and response?	Based on WHO recommendation, joint strategic plan for CBRN (Chemical Biological Radiation, and Nuclear) to be developed
	12.1.1.3 Do national authorities responsible for chemical events have a designated focal point for coordination and communication with the ministry of health and/or the IHR National Focal Point?	In Ministry of Social Welfare as secretariat of Disaster Prevention Central Committee but not sure how this works in case of emergencies, likely military will step in immediately.
	12.1.1.4 Do coordination mechanisms with relevant sectors exist for surveillance and timely response to chemical events?	Chemical, Biological, Radiological, and Nuclear Team may be present in military, to be checked.
	12.1.1.5 Have functional coordination mechanisms with relevant sectors been implemented for surveillance and timely response to chemical events?	To be developed.
	12.1.1.6 Is surveillance in place for chemical events, intoxication or poisonings?	Early warning system for unusual health events (EBS) at MOH.
	12.1.1.7 Has a list of priority chemical events/syndromes that may constitute a potential public health event of national and international concern been identified?	Not available but should be prepared
	12.1.1.8 Is there an inventory of major hazard sites and facilities that could be a source of chemical public health emergencies (e.g. chemical installation and toxic waste sites)?	To be developed.
	12.1.1.9 Has a national chemical profile been developed?	To be developed.
	12.1.1.10a Are there manuals and SOPs for rapid assessment, case management and control of chemical events?	To be developed.
	12.1.1.10b Have manuals and SOPs for rapid assessment, case management and control of chemical events been disseminated?	To be developed.
	12.1.1.11 Is there timely and systematic information exchange between appropriate chemical units, surveillance units and other relevant sectors about urgent chemical events and potential chemical risks?	Not done as much as is known publicly
	12.1.1.12 Is there an emergency response plan that defines the roles and responsibilities of relevant agencies in place for chemical emergencies?	Need to be developed
	12.1.1.13 Has laboratory capacity or access to laboratory capacity been established to confirm priority chemical events?	Not really, only for some chemicals like pesticides
	12.1.1.14a Has a chemical event response plan been tested through occurrence of real event or through a simulation exercise?	Melamine case
	12.1.1.14b Has a chemical event response plan been updated as needed?	No
	12.1.1.15 Is there (are there) an adequately resourced Poison Centre(s) in place?	No
	12.1.1.16 Have country experiences and findings	International concerns are shared with the global

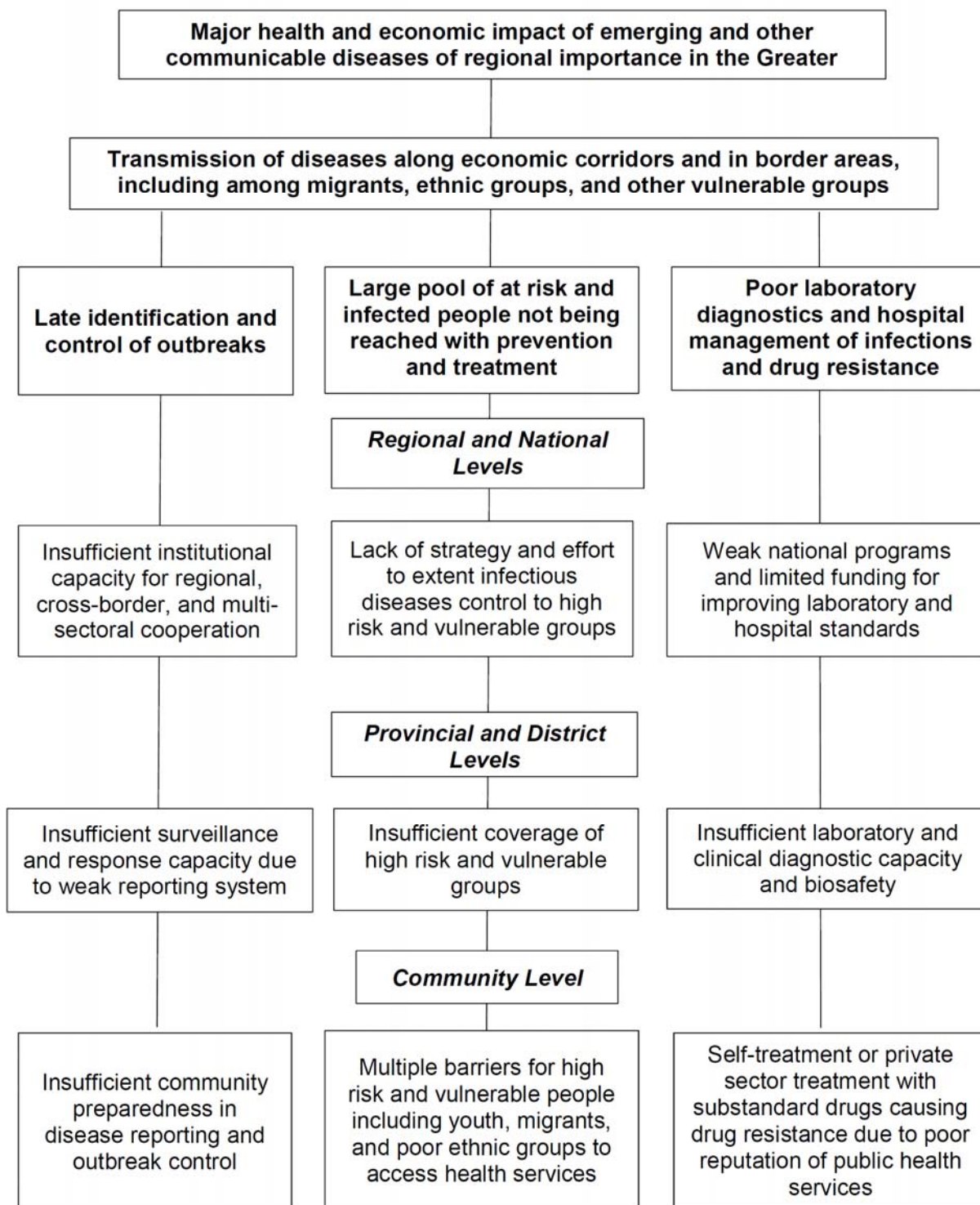
regarding chemical events and risks of national and international concern been shared with the global community?	community
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STRATEGIC AREA: 13.1.1 Mechanisms are established and functioning for detecting and responding to radiological and nuclear emergencies that may constitute a public health event of international concern

	Question	Progress/Problems
	13.1.1.1 Have experts been identified for public health assessment and response to radiological and nuclear events?	MOH has no focal point but perhaps radiology department has some know-how and may serve as ad hoc focal point
	13.1.1.2 Have national policies, strategies or plans been established for the detection, assessment and response to radiation emergencies?	No
	13.1.1.3 Have national policies, strategies or plans been implemented for the detection, assessment and response to radiation emergencies?	Basic public health protection measures are in place
	13.1.1.4 Have national policies, strategies or plans been established for national and international transport of radioactive material, samples and waste management, including those from hospitals and medical services?	Yes, based on WHO guidelines
	13.1.1.5 Is there a functional coordination and communication mechanism between relevant national competent authorities responsible for nuclear regulatory control/safety, and relevant sectors?	No, its ad hoc but based on overall disaster preparedness and response coordination
	13.1.1.6 Have national authorities responsible for radiological and nuclear events designated a focal point for coordination and communication with the ministry of health and/or IHR NFP?	No, but IHR focal point will communicate with other agencies as needed
	13.1.1.7 Does radiation monitoring exist for radiation emergencies that may constitute a public health event of international concern?	Basic emergency capacity in place
	13.1.1.8 Is there systematic information exchange between radiological competent authorities and human health surveillance units about urgent radiological events and potential risks that may constitute a public health emergency of international concern?	Only ad hoc
	13.1.1.9a Have technical guidelines or SOPs been developed for the management of radiation emergencies (including risk assessment, reporting, event confirmation and notification, and investigation)?	Basic instructions available based on WHO guidelines, to be developed
	13.1.1.9b Have technical guidelines or SOPs for the management of radiation emergencies (including risk assessment, reporting, event confirmation and notification, and investigation) been evaluated and updated?	No, needed
	13.1.1.10 Is there a radiation emergency response plan?	Basic response plan
	13.1.1.11 Have radiation emergency response drills been carried out regularly, including the requesting	No

	of international assistance (as needed) and international notification?	
	13.1.1.12 Is there a mechanism in place to access health facilities (inside or outside the country) with capacity to manage patients of radiation emergencies?	No
	13.1.1.13 Does the country have access (nationally or internationally) to laboratory capacity to detect and confirm the presence of radiation and identify its type (alpha, beta, or gamma) for potential radiation hazards?	Internationally yes
	13.1.1.14 Are there collaborative mechanisms in place for access [119] to specialized laboratories that are able to perform bioassays, biological dosimetry by cytogenetic analysis and ESR?	Can be arranged through WHO
	13.1.1.15 Have collaborative mechanisms for access to specialized laboratories that are able to perform bioassays, biological dosimetry by cytogenetic analysis and ESR been evaluated?	Not done
	13.1.1.16 Have country experiences with the detection and response to radiological risks and events been documented and shared with the global community?	NA.

Appendix 3: PROBLEM TREE



Appendix 4: RESULTS FRAMEWORK

GMS Health Security Sector Outcomes		GMS Health Security Outputs		ADB GMS Health Sector Operations	
Impact/Outcomes with ADB Contribution	Indicators with Targets & Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Contributions
<p>Impact by 2025: GMS public health security enhanced</p> <p>Outcome by 2020: GMS Health Security System achieved IHR/APSED standards</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas accessed services for communicable diseases control (CDC)</p>	<p>Impact indicators Zero major outbreaks of emerging or other epidemic disease in excess of 100 fatalities Outbreaks have less than 0.5% impact on GDP in any quarter of the year Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas receiving treatment for HIV and TB doubled</p> <p>Outcome indicators IHR/APSED compliance increases from 70% to 90% average</p> <p>Coverage of disease control interventions in MEVs increases from 60% to 80% average</p>	<p>Enhanced GMS collaboration and CDC in border areas by 2020:</p> <p>Strengthened national surveillance and response system by 2020</p> <p>Improved diagnostic and management capacity of infectious diseases by 2020:</p>	<p>GMS countries report all suspected cases of notifiable communicable within 24 hrs (from zero) Each province conducts cross border and intersectoral disease control activities MEVs reached with CDC programs doubled by 2020 By 2020, all targeted public hospitals conduct web-based reporting of notifiable diseases within 12 hrs and case investigation within 24 hrs compared to 80% in 2014 Targeted laboratories meeting national quality and biosafety standards increases from 30% to 60% Targeted hospitals meeting 60% of IPC and case management standards increased from 30% to 80%</p>	<p>Planned key activity areas: GMS Health Security Project \$125 million: Cambodia \$21.0 million ADF loan; Laos \$8 million grant and \$4 million ADF loan Myanmar \$12.0 million ADF loan Viet Nam \$80.0 million ADF loan</p> <p>ADB Projects in the pipeline with estimated amounts: tbd</p> <p>Ongoing ADB projects with approved amounts: Second GMS CDC Project \$63.5 million Strengthening HIV Prevention Capacity in the GMS Project \$20.3 million Regional Capacity Building TA for Malaria Elimination and CDC capacity building Project \$17.2 million</p>	<p>Planned key activity areas: Regional, cross-border and intersectoral collaboration for CDC among all GMS countries; including joint planning to reach MEVs; Outreach program to link MEVs with CDC program Web-based surveillance system including community syndromic reporting, and rapid outbreak response Laboratories with better biosafety and quality of diagnostic tests Hospital with better infection prevention and control and case management of infectious diseases</p> <p>Planned projects: tbd</p> <p>Ongoing projects: HIV prevention Malaria control</p>

Source: ADB.

CDC = Communicable Diseases Control; GMS = Greater Mekong Subregion; HMT = HIV/AIDS, Malaria and Tuberculosis

VIET NAM HEALTH SECTOR ANALYSIS

Project Number: 48118-REG
2016

**R-PPTA 8842: THE GREATER MEKONG
SUBREGION HEALTH SECURITY PROJECT**

Table of Contents

Acronyms.....	3
SUMMARY.....	5
I. INTRODUCTION AND COUNTRY PROFILE	7
a. Purpose of Analysis	7
b. Global, Regional and National Health Threats	7
c. Public Health Security.....	8
d. Country Profile.....	9
e. Health Sector Profile.....	10
II. SPECIFIC COMMUNICABLE DISEASES ANALYSIS	11
a. Dangerous communicable diseases	11
b. Dengue fever	12
c. Malaria.....	12
d. HIV/AIDS	15
e. Other Infectious Diseases.....	16
III. VIET NAM PREVENTIVE MEDICINE SYSTEM.....	17
IV. SURVEILLANCE AND RESPONSE SYSTEM FOR COMUNICABLE DISEASES.....	19
a. Policy and Legislation	19
b. Surveillance and Response Structure.....	20
c. Health Quarantine.....	20
d. Health Management Information System.....	21
e. Viet Nam APSED/IHR Evaluation	23
f. Summary of issues in surveillance and response	24
g. Recommendations for designing the health security project	25
V. INFECTION PREVENTION AND CONTROL ANALYSIS.....	26
VI. PROJECT SCOPING	30
a. Key Features	30
b. Indicative Project Scope	30
c. Indicative Management Arrangements.....	32
d. Safeguards and Risks.....	32
VII. CONCLUSIONS AND RECOMMENDATIONS	33
a. Conclusions	33
b. Recommendations.....	34
c. Preparatory Work.....	35
Appendixes.....	35
Appendix 1: HEALTH SECTOR PROFILE	36
Appendix 2: ACCESS TO HEALTH CARE SERVICES IN VIETNAM.....	37
Appendix 3: BASIC PROVINCE HEALTH DATA.....	42
Appendix 4: PROBLEM TREE	44
Appendix 5: Results Framework.....	45

Tables and charts

Table 1: Basic Health Indicators	10
Table 2: Distribution of malaria parasites by area in 2015	13
Table 3: Funding for Malaria Program Period 2011-2015 (Million VND)	14
Table 4: HIV and AIDS Estimates, 2013	15
Table 5: Assessment APSED score	23
Table 6: Training on IPC for heads of IPC ward/unit in hospitals	27
Table 7: Some IPC related indicators from selected project provinces	28
Chart 1: The situation of malaria in the period 2000-2014	13
Chart 2: Preventive medicine organizational structure	17

Acronyms

ADB	—	Asian Development Bank
ADF	—	Asian Development Fund
AI	—	Avian Influenza
AIDS	—	acquired immunodeficiency syndrome
APSED	—	Asia Pacific Strategy for Emerging Diseases
ART	—	anti-retroviral treatment (for HIV/AIDS)
ASEAN	—	Association of Southeast Asian Nations
BSL	—	biosafety level
CBR	—	crude birth rate
CDC	—	communicable diseases control
CDC2	—	GMS second communicable diseases control project
CDR	—	crude death rate
CHS	—	commune health station
DG	—	director general
DHC	—	district health center
EA	—	executing agency
e-CDS	—	electronic-communicable diseases surveillance
EHF	—	Ebola hemorrhagic fever
EID	—	emerging infectious diseases
EM	—	ethnic minority
EOC	—	emergency operations center
FAO	—	Food and Agriculture Organization
FMA	—	financial management assessment
GDP	—	gross domestic product
GDPM	—	general department of preventive medicine
GMS	—	Greater Mekong Subregion
GSO	—	general statistics office
GVN	—	Government of Viet Nam
HCMC	—	Ho Chi Minh City
HFMD	—	hand foot and mouth disease
HMIS	—	health management information system
HIV	—	human immunodeficiency virus
HSPI	—	Health Strategy and Policy Institution
IA	—	implementing agency
IHR	—	international health regulations
IMPE	—	Institute of Malaria, Parasitology, and Epidemiology
IMR	—	infant mortality rate
IT	—	information technology
IPC	—	infection prevention and control
ISO	—	International Standard Organization
LAO PDR	—	Lao People's Democratic Republic
MARD	—	Ministry of Agriculture and Rural Development
MDG	—	millennium development goal
MERS	—	Middle East respiratory syndrome
MEV	—	migrants, mobile people, ethnic minorities, and other vulnerable groups
MMR	—	maternal mortality ratio
MSA	—	medical services administration
MOH	—	Ministry of Health
MOLISA	—	Ministry of Labor, Invalids, and Social Affairs
NCD	—	non communicable diseases
NFP	—	national focal point
NIHE	—	National Institute of Hygiene and Epidemiology

NIMPE	—	National Institute of Malaria, Parasitology, and Epidemiology
NTD	—	neglected tropical diseases
NTP	—	national targeted program
PCR	—	polymerase chain reaction
PHE	—	public health event
PLHIV	—	people living with HIV
PMU	—	project management unit
PPC	—	People's Party Committee
PPMC	—	provincial preventive medicine center
PPTA	—	project preparatory technical assistance
SARS	—	severe acute respiratory syndrome
SDG	—	sustainable development goal
SPR	—	sustainable poverty reduction
STD	—	sexually transmitted diseases
TB	—	tuberculosis
TOT	—	training of teachers
UHC	—	universal health coverage
USCDC	—	United States Center for Disease Control
VAAC	—	Vietnam Administration of HIV/AIDS Control
VAMS	—	Viet Nam Administration of Medical Services
VLHSS	—	Viet Nam Living Household Standards Survey
WHO	—	World Health Organization
WHR	—	world health report

SUMMARY

This report summarizes the Viet Nam health analysis in preparation of the Greater Mekong Subregion (GMS) Health Security Project (the project) for Cambodia, Laos, Myanmar and Viet Nam. The Governments have requested the Asian Development Bank (ADB) to finance the project. The report was prepared by the Viet Nam Co-Team leader/Public Health Specialist.

Emerging infectious diseases (EIDs) like avian influenza, SARS, MERS and Ebola hemorrhagic fever and recurrent diseases like cholera have the potential to spread quickly around the globe, with major economic and sometimes devastating human impact. Other diseases of global importance like HIV, TB, malaria, and dengue spread less quickly but do not stop at borders and cause major impact at household level. Drug resistance is potentially one of the most threatening emerging problems to deal with common bacterial infections, STDs, HIV, malaria, tuberculosis, and nosocomial infections.

Viet Nam is highly vulnerable to outbreaks and epidemics of infectious diseases. Major economic corridors and ports have improved connectivity and linked Viet Nam with the GMS, ASEAN, and the global economy. Tourism, business travel, labor migrants and other mobile people have increased rapidly. While Viet Nam has an extensive network of public health services, a large part of the population uses other health services that are outside the surveillance system. There are underserved populations of ethnic minorities, migrants in labor camps, and other vulnerable groups that are more at risk of getting and spreading infections.

Viet Nam is highly committed to implement the International Health Regulations (IHR) 2005 and the Asia Pacific Strategy for Emerging Diseases (APSED) 2010, as well as the regional strategies for the control of dengue, malaria, tuberculosis and HIV/AIDS. With strong political commitments and support from partners, disease specific control programs and general health system capacity to deal with EIDs and other health threats have improved dramatically in recent years. Viet Nam has the institutional capacity to diagnose most EIDs, and most disease outbreaks were identified and controlled at an early stage, because of strong community organization and a functioning surveillance and response system. Viet Nam has almost achieved IHR core capacities, with an average scope of 96%.

However, these are very basic core capacities. Unconfirmed cases and events indicate that there are gaps in the surveillance and response system, and laboratory biosafety and diagnostics and hospital infection control are not up to standard. In particular, there are gaps in reporting from underserved populations such as ethnic minorities and migrant laborers, and in regional, cross-border, intersectoral and public-private cooperation. These gaps do not specifically emerge from current evaluation instruments. Viet Nam MOH will need to further strengthen its core capacities to become more resilient to the threat of EIDs and other diseases of global importance.

To assist Viet Nam meet its obligations under IHR/APSED and a number of other treaties and agreements, it is proposed that the project supports several core capacities, including broadening the surveillance and response network including regional and cross-border cooperation, port-of-entry services, syndromic reporting at village level; risk analysis, risk communication, and community preparedness; and help strengthen district laboratory services and hospital infection prevention and control (IPC). Specifically for Viet Nam, it is also proposed that the project supports the Government policy of integrating district health services. This follows ADB support for various health projects for communicable diseases control (CDC), HIV, malaria, and related regional technical assistance in the GMS under its GMS economic development program.

As discussed with the General Department of Preventive Medicine (GDPM) representing the Ministry of Health, Viet Nam, the proposed **project goal** is strengthened GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities; (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year; and (iii) increased use of public health services in border areas by MEVs. The proposed **project outcomes** are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed **project outputs** are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed **project targets** 250 districts in 36 provinces along the borders and economic corridors with China, Lao PDR and Cambodia.

The project will be implemented through GDPM with the assistance of VAMS, NIHE, Pasteur HCMC and provincial health offices as implementing agencies. The total cost is estimated at \$84 million, for the period 2017-2022.

The main project risk is that project-facilitated district health services do not reach vulnerable groups most at risk including isolated ethnic minorities and migrants in labor camps. This risk will need to be mitigated through participatory planning, mainstreaming outreach in annual operational plans and budgets, and logistic and technical support. Other project risks concern procurement of appropriate laboratory equipment of high quality, and financial management. In general, the project is considered to be low to moderate risk in view of past MOH experiences with similar projects. A project management unit is proposed in GDPM to help manage staff constraints and implementation risks. At provincial level, provincial health offices will be assisted with project implementation.

I. INTRODUCTION AND COUNTRY PROFILE

a. Purpose of Analysis

1. Under the Greater Mekong Subregion (GMS) economic development program, the Governments of Cambodia, Laos, Myanmar and Viet Nam are considering support from the Asian Development Bank (ADB) for a GMS Health Security Project (the project). The purpose is to strengthen national health security systems and regional cooperation for the prevention and control of emerging infectious diseases (EIDs) and other diseases of regional importance in the GMS, and help countries comply with the International Health Regulations (IHR) 2005 and implement the Asian Pacific Strategy for Emerging Diseases (APSED) of the World Health Organization.¹ This follows ADB support for various health projects for communicable diseases control (CDC), HIV, malaria, and related regional technical assistance in the GMS under its GMS economic development program.²

2. As part of the project preparatory technical assistance (PPTA), the Viet Nam public health consultant and co-team leader undertook a health sector analysis for the proposed GMS Health Security Project for Viet Nam. The purpose was to examine relevance of the proposed scope, and identify project priorities and risks in Viet Nam. This report includes (i) a general sector review to identify health system priorities and constraints; (ii) a specific review of public health security progress and gaps; and (iii) review of proposed project scope, risks and implementation and monitoring arrangements.

b. Global, Regional and National Health Threats

3. After the outbreak of severe acute respiratory syndrome (SARS) in 2003 and avian influenza outbreak in 2004, several other outbreaks of emerging infectious diseases occurred in the GMS. Globally, several dangerous strains of influenza A circulate in the region including H7N9, H5N6, H5N1, and H1N1. Over 1,200 cases and 400 deaths due to Middle-East Respiratory Virus (MERS) have been reported in 20 countries, including most recently in Korea. More than 14,000 deaths due to Ebola Hemorrhagic Fever (EHF) have been reported among 28,000 EHF cases in the West Africa outbreak. WHO has announced a state of emergency on the Ebola virus worldwide. EIDs and some old world infections like cholera have the potential to spread quickly around the globe, with major economic and sometimes devastating human impact. Other diseases of regional importance like HIV, Tuberculosis, malaria, and dengue spread less quickly but do not stop at borders and cause major impact at household level. Drug resistance is potentially one of the most threatening emerging problems to deal with common bacterial infections, sexually transmitted diseases (STDs), HIV, malaria, tuberculosis, and nosocomial infections.

4. Viet Nam is highly vulnerable to spread infections due to open borders and increasing connectivity. Major economic corridors transect the country, and tourism is increasing rapidly, in addition to a sharp increase in business travel, mobile people and migrants. At the same time, there are underserved populations of ethnic minorities, migrants in labor camps, and other vulnerable groups that are more at risk of getting and spreading infections. Viet Nam has capacity for diagnostics of most emerging diseases, and most cases of EIDs were identified and controlled at an early stage, thanks to a functioning surveillance and response system. However, a large number of unconfirmed cases and

¹ World Health Organization. International Health Regulations.2005; Asia Pacific Strategy for Emerging Diseases. 2010.

² Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

events suggests there are gaps in the surveillance and response system. While core functions for IHR are mostly in place, regional, community and intersectoral networking needs to be strengthened. Viet Nam has to become more resilient to the threat of emerging diseases and other diseases of global importance.

c. Public Health Security

5. The term “public health security”, or sometimes called “public health resilience” became popular after formulation of IHR 2005, in view of the threat of EIDs. WHO, in the World Health Report (WHR) 2007, coined it as *a set of activities, proactive and retroactive, to minimize vulnerability to acute public health events that endanger the collective health of populations*. Public health security is complementary to individual health security. They are closely intertwined,³ and both contribute to achieving universal health coverage (UHC), which is quality health care for all, as one of the sustainable development goals (SDG) by 2030.

6. The term public health security may be more narrowly used for taking measures to reduce the threat of EIDs such as influenza, SARS, MERS and EHF. However, in the broader context it also concerns the (potential) spread of other infections in and across populations, such as cholera, dengue, zika, and HFMD (hand, foot and mouth disease) in the GMS. The spread of diseases through drug resistance, including HIV, bacterial infections, malaria and tuberculosis constitutes a real regional and global threat, and require high priority.

7. Health security includes (i) measures to avoid emergence of diseases (biosafety, immunity, safer drugs), and (ii) measures to interrupt disease transmission (hygiene, vaccination, isolation, treatment). While the usual focus is on interrupting transmission, in view of declining public exposure to pathogens and increasing drug resistance, more attention should be given to avoiding the emergence of new diseases, e.g., by controlling the sale of antibiotics and improving nutrition status.

8. Health security depends on strong government commitment, given the public goods nature, and depends on all chains in a health security system, as reflected in APSED, to be in place. Second, health security depends on core capacity of a basic health system (sometimes this is not given attention in APSED assessments). Within the health sector, this includes leadership, communication, adequate financing, logistics, and private sector participation; and, outside the health sector, local government capacity. Third, health security depends on community participation in prevention and reporting suspected cases. For example, the EHF outbreak in West Africa was largely controlled through community action including social distancing, assistance in contact tracing, and sanitary measures. Communities not connected to health services, often located in border areas and with a higher burden of communicable diseases, are of major concern. Fourth, health security also depends on security in neighboring countries, and in regional and cross-border cooperation. In 5 years, all GMS countries, as part of ASEAN, should develop adequate surveillance and response systems, and in 15 years all countries should achieve adequate infection prevention and control (IPC) based on WHO standards.

9. Accordingly, the scope of a health security project is not simply filling IHR/APSED gaps, although this is a major part. It also concerns improving access of high risk groups to the health system to support control of emerging diseases, and strengthening relevant parts of the health system. While these strategic areas may be addressed through other sector

³ The term “health resilience” was used in the opening speech of the May 2015 WHO Health Assembly. Public health security may be understood in a narrow sense as the capacity to avoid and contain epidemics. In the wider context, health security may also concern man-made chemical and radiological threats, natural disasters and perhaps also epidemics like obesity and road traffic accidents.

developments, specific gaps that affect health security need to be identified and addressed. Regular APSED monitoring therefore should incorporate health system assessment relevant to health security and be linked to sector-wide remedial actions. Lastly, governments, regional networks and partners need to come together in an integrated program approach, as this may otherwise lead to fragmentation and duplication, and increase the likelihood of outbreaks. Program coordination in rolling out IHR/APSED also needs to be monitored.

10. Government intervention in health security and CDC is justified on the basis for public good and externalities, market failure, and equity issues with high benefit cost ratios. Emerging diseases, the spread of other infections of regional relevance, and drug resistance also constitute national and global security concerns in terms of potential for major human disaster and economic meltdown, requiring government intervention. However, that does not imply that the government should provide these services, but should consider other ways, including regulation and contracting out, given government's operational constraints, and encourage private sector participation. While there is an increasing pressure to shift government funds to non-communicable diseases (NCD), the age-specific burden of diseases shows communicable diseases kill far more children than NCDs, in particular the poor.

11. Viet Nam is committed to fulfill its obligation to build up core capacity in the fight against EIDs and other public health events under the International Health Regulation (IHR 2005).⁵ Viet Nam participates in the implementation of the WHO-led APSED. The country is close to compliance with IHR requirements, which are due by 2016. Hence, the government is committed and pressed to take the final steps in bringing the country up to international standards for public health security.

d. Country Profile

12. Viet Nam, with a projected population of 94.5 million in 2016,⁶ has maintained high economic growth at around 6% on average,⁷ with growth projected to be sustained at this level.⁸ Average per capita gross domestic product was estimated at \$2,111 per year in 2015 (the World Bank). Viet Nam needs to increase labor productivity to maintain such rapid growth. It faces both internal challenges such as human resources development, and financial restructuring.⁹

13. As a result of recent economic growth, poverty rates have been steadily decreasing for at least the past two decades.¹⁰ Viet Nam's income distribution across the population is in line with other lower middle-income countries. There is a trend, however, towards increasing income inequality.¹¹ Trends in poverty rates have been confusing as different government and partner agencies have applied different thresholds. Whichever criteria are applied, two conclusions are clear: (i) poverty rates have fallen dramatically over the past 20 years; and (ii) there are serious imbalances in poverty rates. Much higher poverty rates are observed in the north-western mountains, which tend to have larger populations of ethnic minorities who

⁵ WHO International Health Regulations 2005 Second Edition. The IHR (2005) is a legally binding document for all member states of the WHO. The purpose and scope of IHR are to “prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade”. Cambodia has also actively participated in different activities at national, regional and global levels leading to the adoption of the IHR (2005).

⁶ Socialist Republic of Viet Nam. *Fifteen Years Achieving the Viet Nam Millennium Development Goals*. 2015. Hanoi.

⁷ ADB 2016 Asian Development Outlook: *Asia's Potential Growth*.

⁸ ADB 2016 Asian Development Outlook: *Asia's Potential Growth*.

⁹ ADB 2016 Asian Development Outlook: *Asia's Potential Growth*.

¹⁰ The World Bank *Well Begun, Not Yet Done: Vietnam's Remarkable Progress on Poverty Reduction and the*

¹¹ General Statistics Office. *Viet Nam Household Living Standards Survey (VLHSS)*. 2010 Hanoi.

rely on subsistence agriculture, and, to a lesser extent, among other upland regions and the central coastal region, which experiences frequent droughts and floods.¹² Poverty density mapping, however, revealed that the greatest numbers of poor live in the deltas regions around Hanoi and Ho Chi Minh City.¹⁶

14. Based on an income of \$1 per day, the proportion of people living at or below the poverty line fell from 58% in 1993 to 14.5% in 2008. MOLISA has introduced a new poverty line of about \$1.33 and \$1.66 per person per day in rural and urban areas, respectively. Accordingly, the poverty rate was reported as 7.8% in 2013, and the near poor were 6.3%.¹⁷

e. Health Sector Profile

15. Over the past decades, Viet Nam has made important achievements in both the economic and social sectors, including health. Vietnam continues to make progress in the implementation of the millennium development goals (MDGs) and has made significant achievements in health care for the people especially for children and women, and gender equality. The health related goals are significantly improved. However, some targets need more efforts, such as mortality rate among the group of children under age 5, maternal mortality ratio and the proportion of access to sanitary latrines.

Table 1: Basic Health Indicators

Indicators	2010	2011	2013
Population size (million)	86.93	87.84	89.71
The average life expectancy (age)	72.9	73.0	73.1
The maternal mortality ratio (per 100,000 live births)	68	67	49
The mortality rate of children under 1-year-old (per 1,000 live births)	15,8	15,5	15,3
The mortality rate of children under 5 years old (per 1,000 live births)	23.8	23,3	23.1
Birth Reduction rate (‰)	0.50	0.50	0.20
The population growth rate (%)	1.05	1.04	1.05
Sex ratio at birth (boys/100 girls)	111,2	111,9	113.8
Percentage of children under 5-year-old malnourished (underweight) (%)	18,0	16,8	15,3
The prevalence of HIV/AIDS in the community (%)	<0.3	<0.3	<0.3

Source: Joint Annual Health Review 2014

16. According to GSO estimates in 2013 average life expectancy in Viet Nam reached 73.1 years of age, considerably highest among Asian developing countries with similar income levels. In 2013, estimates indicate that Viet Nam had a total of 690 female deaths related to pregnancy and childbirth, and the maternal mortality ratio (MMR) fell to 49 deaths per 100,000 live births, relatively low compared to other developing countries in Asia.

17. The mortality rate of children under 1-year-old (IMR) and under 5-year-old tend to decrease gradually. IMR in Viet Nam was estimated at 15.3 deaths per 1,000 live births and the under-five mortality rate (U5MR) at 23.1 deaths per 1,000 live births. Difference between urban and rural areas remains high and does not decrease, or even increase, from 1.98

¹² CEMA Hanoi, *Poverty Situation Analysis of Ethnic Minorities in Vietnam 2007-2012 Key Findings from Quantitative Study SUB-PRPP Project*. Dec. 2013.

¹⁶ Swinkels, Rob. and Carrie Turk. 2006. *Explaining Ethnic Minority Poverty in Viet Nam: summary of recent trends and current challenges*. 2006. World Bank; World Bank 2004. *Poverty Mapping in Viet Nam*. Washington DC.

¹⁷ Demombynes, Gabriel, Linh Hoang Vu. 2011. *Demystifying Poverty Measurement in Viet Nam*.

times (2010) to 2.13 (2011). Neonatal mortality (within 28 days from birth) remains a problem, accounting for 60% of deaths in children under 1-year-old and 40% of deaths in children under 5-year-old.¹⁹

18. The malnutrition rate among children under 5 is 15.3% in 2013 compared to the rate of 18% in 2010. However, there is a gap within the areas in the country. The rate is highest at Central Highlands, Northern Midland and mountainous areas, up to about 30%.

II. SPECIFIC COMMUNICABLE DISEASES ANALYSIS

19. Viet Nam is currently facing a double burden of disease. In the past few years, disease patterns have seen important shifts, with decline in the share of morbidity from communicable diseases and an increase in non-communicable diseases, accidents and injuries. Nevertheless, some communicable diseases continue to have high prevalence rates in endemic regions, such as dengue fever in the Mekong Delta, malaria in the Northern Mountains and Central Highlands, and TB in the South. Some diseases have made a comeback and are spreading rapidly over a wide area.

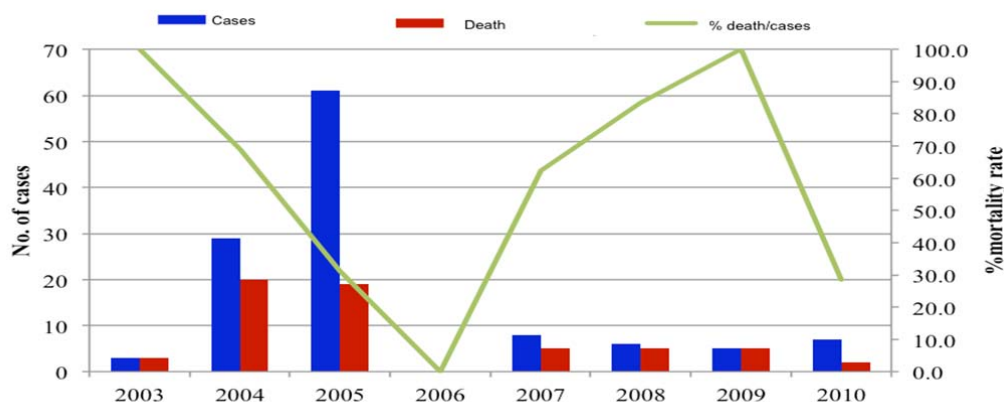
a. Dangerous communicable diseases

20. Over the years, several dangerous emerging diseases around the world have spread to Viet Nam such as SARS, avian influenza A (H5N1), pandemic influenza A (H1N1), greatly affecting national social stabilization. Moreover, many newly emerged diseases have been threatening to invade Viet Nam such as EHF, MERS-CoV, and especially influenza A (H7N9) which occurred in some People's Republic of China provinces bordering Viet Nam while China-Viet Nam commerce is very large and poultry smuggling is not thoroughly controlled.

21. From 2003 to 2010, a total of 7 outbreaks of influenza A/H5N1 in human with a total of 119 infected cases and 59 deaths. The mortality rate was 49.5%. So far, 63 provinces nationwide appeared to be infected with influenza A H5N1 in poultry, with a total of 50 million poultry destruction out of a total of some 250 million birds.²⁰ According to the WHO warning, there is a potential risk that the epidemic rooted from Viet Nam will threaten the countries in the region and around the world. Currently, evidences show that influenza virus A/H5N1 is changing rapidly and there is possibility a new strain from the influenza virus A/H5N1. With a new virus with a highly pathogen and likely to spread from person to person, an influenza pandemic would cause serious impacts to public health, economic situation and social stability.

¹⁹ UN in Viet Nam. Reach the Millennium Development Goals in equality.

²⁰ WHO (2010), "Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO".

Chart 1: Human Cases of Avian Influenza A/(H5N1)

b. Dengue fever

22. The mosquito-borne disease tends to become very severe after three to five recent years. Dengue fever is still circulating in most provinces/cities, but focuses primarily in Central and Southern provinces. Previously, there were over 100,000 cases reported annually. During the period from 2000 to 2014, with the National Target Program (NTP) being implemented, disease situation decreased, with 50,000 to 100,000 cases and a little less than 100 deaths reported annually. The number of cases gradually declined over the years, with the 10-year low of 31,848 cases and 20 deaths reported in 2014. In the first 9 months of 2015, there were 43,141 cases and 28 deaths reported in 53 provinces/cities. Compared to the average for the period from 2000 to 2014, in the first 9 months of 2015, the number of cases and deaths decreased 14.9% and 42.4%, respectively. However, the number of cases increased compared to the same period in 2014 (the year with lowest reported number of cases in the past 10 years).²¹ Many fatalities were due to late admission, when the virus has caused kidney, liver, lung, or heart failure. Adults can suffer brain hemorrhage in severe cases.

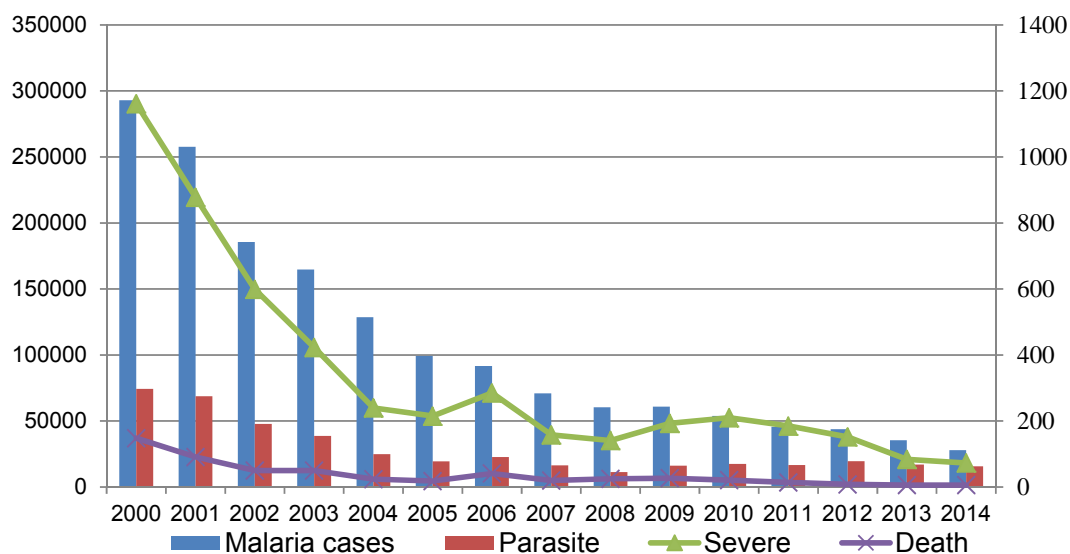
23. There are several limitations in controlling the dengue fever's increasing number of cases; such as, there are currently no vaccine²² and disease-specific drug; water-storing habit of the majority of the population in the Mekong delta and regions with frequent storms and flooding as well as water collection resulting from rapid urbanization have altogether created a favorable environment for mosquito to breed and spread the disease. There is also a need to educate people to early identify the symptoms and seek to health services.

c. Malaria

24. The national malaria program in Viet Nam has recently switched from control to elimination. The epidemic has been reduced but there are many risks of increase again; vector exists; and more risk of drug-resistant parasites.

²¹ JAHR 2014.

²² Viet Nam is one of five countries in Asia taking part in the third stage of the experimental process for Dengue fever vaccine.

Chart 1: The situation of malaria in the period 2000-2014**Table 2: Distribution of malaria parasites by area in 2015**

No.	Area	First 6 months of 2015	First 6 months of 2014	% increase/decrease
1	Northern mountainous	41	57	-28,1
2	Northern Midland	33	25	32,0
3	Central region	223	159	40,3
4	Central Coast	1.566	2.009	-22,1
5	Highland	2.468	1.806	36,7
6	South East	1.219	668	82,5
7	Mekong Delta	73	86	-15,1

Source: Data from NIMPE

25. A recent study conducted in 2014 confirmed that in Central Viet Nam a substantial part of the human malaria reservoir is hidden.²³ Detailed findings include: malaria prevalence by microscopy was 7.8%, mostly *Plasmodium falciparum* (81.4%) or *Plasmodium vivax* (17.7%) mono-infections; a large majority (69.9%) was asymptomatic. By PCR, the prevalence was estimated at 22.6% with a higher proportion of *P. vivax* mono-infections (43.2%). The proportion of sub-patent infections increased with increasing age and with decreasing prevalence across villages. The main risk factors were young age, village, house structure, and absence of bed net. 100% funding for the implementation of programs to combat malaria at the local level is from tight state budgets, primarily payroll for staff at malaria control centers. The technical activities and community media have hardly been implemented.

²³ Pham Vinh Thanh et al, *Epidemiology of forest malaria in Central Vietnam: the hidden parasite reservoir*, 2014.

Table 3: Funding for Malaria Program Period 2011-2015 (Million VND²⁴)

Year	State budget	Globe fund	WHO and others	Total
2011	105.000	117.600	2.625	225.225
2012	96.000	92.400	7.602	196.002
2013	95.000	96.600	7.791	199.391
2014	56.000	317.100	21.000	394.100
2015	60.000	92.061	17.000	169.061
Total	412.000	715.761	56.018	1.183.779

Source: NIMPE 2015

26. During the field trips to Tay Ninh and Gia Lai, it was found that it is difficult to reach workers, farmers at remote milpas, rubber plantations. Especially, farmers often spend months in remote milpas, therefore their access to health services, including both prevention and care, is very limited.

27. In Dien Bien and Ha Giang, ethnic minority people such as Hmong have backward practices, limited access to health services, giving birth at home, worship when sick instead of seeking treatment and care at the health facility. Meanwhile, health services face difficulties in reaching out ethnic minority people living in geographically difficult areas, mainly in the border areas. In addition, health services in the most difficult areas are still limited, low quality due to deficiency of qualified human resources and lack of investment in infrastructure. Villages health worker network is of limited capacity to reach these targets, including migrant people across the borders.

28. Reflecting the general situation of the country, although malaria has been much reduced, it is more likely to come back in the border provinces. In addition, there are issues of vector existence, risk of drug-resistant parasites. To deal with the current issues, the visited border provinces have developed epidemiology maps and identified priority services. The remote and border areas have always been considered priority areas of surveillance, control and response activities.

29. Malaria epidemics in Lao PDR happened more often than in Viet Nam side. Moreover, Laos' border provinces' capacity to implement malaria control programs is poor; health network is limited. They need support and better coordination to enhance disease control in the region and across the border. Many malaria patients from Laos sought services at health facilities in Viet Nam.

30. Summary of problems and challenges to malaria prevention and control program:

- The total population living in high risk areas of malaria (11.7 million), are mainly the poor, ethnic minorities living in mountainous, remote and extremely difficult areas such as Central Highlands, and northwestern border regions. Seasonal mobility of local residents from malaria-free regions to malaria endemic areas increases the risk of spread of malaria. People crossing borders between the countries with high malaria and drug resistance parasite also increase the risk of spreading drug resistance plasmodium. The people, who work and stay overnight in forest/kaingin,

²⁴ 1USD = 22,000 VND.

rarely use nets and other personal protective measures, therefore they are at higher risk of being infected with malaria.

- The quality of diagnosis and treatment of malaria at the grassroots level is not high. Besides, human resources for malaria prevention at the grassroots level do not meet the demand, especially in remote areas. In some localities, participation of village health workers is very limited or there is no participation in prevention, diagnosis and care of malaria patients.
- ART resistance plasmodium falciparum has appeared in several provinces and is possibly spread to other localities. Mosquitoes transmitting malaria has changed their behavior, staying and biting people outside houses more often, and therefore it is more difficult to prevent biting by spraying and nets. An epiroticus appears to be resistant to pyrethroid insecticide, which is the insecticide being currently used.
- State funds for malaria control program are limited, unstable and have been cut in recent years. Financial aid from international donors has also been reduced for malaria prevention activities. Many localities have not been paying proper attention and investment to the malaria prevention and control due to the recently reducing number of malaria cases.

d. HIV/AIDS

31. According to estimates from the WHO and the Government of Viet Nam (GVN), an estimated 258,524 people living with HIV (PLHIV)²⁵ in 2013 amounted to an estimated HIV prevalence in the general population (aged 15-49 years) of 0.39%. The national mean prevalence is consistently below 0.4% and has been falling over the past decade, as the mean prevalence among pregnant women, currently estimated at 0.15%. No national generalized epidemic appears imminent; however, the persistent and shifting dynamics of the epidemic among high-risk populations in Viet Nam require continuous attention to avoid the threat of HIV spreading from high-risk groups to the general population.

32. In recent years, the annual number of new HIV cases, and the number of AIDS cases and deaths related to AIDS are reported to have gradually declined. However, the level of decline is neither rapid nor sustainable, so cumulative indicators continue to increase. In some localities, particularly mountainous, remote and isolated areas, the number of new HIV infections continues to increase each year. In addition, trends in risk factors for HIV are unpredictable and difficult to control, including injecting drug use, use of synthetic drugs, commercial sex work, and men having sex with men.

Table 4: HIV and AIDS Estimates, 2013

Indicator	2013
PLHIV	258,524
Adult HIV Prevalence	0.39%
PWIDs with HIV	108,400
Women (15+) with HIV	71,000
Children with HIV	5,000
AIDS deaths (2012)	12,000

Source: VAAC report, MOH

33. The government's National Strategy on HIV/AIDS Prevention and Control, 2010-2020, covers a full range of considerations required for a robust national HIV/AIDS response. In implementing its national strategy, the government has relied heavily on technical and funding support from international donors. As of 2013, the GVN estimated that international

²⁵ Kato, M. et al, "Enhancing the Benefits of Antiretroviral Therapy in Vietnam: Towards Ending AIDS," WHO, 2014.

funding sources account for 70% of funding for HIV/AIDS programs and services. As a middle-income country, funding support from international donors is rapidly shrinking, and Viet Nam is under increased pressure to transition to fiscal and technical ownership of its national HIV/AIDS programs and services.

34. Viet Nam is in a period of rapid economic growth. Roads are improving, expanding connections with other countries in the region. The development of infrastructure attracts large numbers of migrant workers. Greater mobility, higher incomes and changing social values can create multiple risk behaviors, particularly among youth. More regional connection and more mobility is a factor increasing the spread of HIV. This issue should be resolved through coordinated action in appropriate areas, especially for those people living along the corridor and border areas. However, these populations often have little access to education and essential health services due to their legal status, mobility, isolation, and sometimes to poverty and language issues.

e. Other Infectious Diseases

35. Hand, foot and mouth disease was first reported in Viet Nam in 2005 and started showing an increasing trend since 2011. In 2014, there were 80,685 cases reported nationally with 8 deaths reported in Kien Giang (2), Long An (1), Ba Ria-Vung Tau (1), Dong Thap (1), An Giang (1), Ho Chi Minh city (1), and Bac Lieu (1). Compared to the average for the period from 2011 to 2013, the number of cases decreased of 31.9% and the number of deaths decreased of 90.0%. However, hand, foot and mouth disease still circulates at high level in many provinces/cities. The control of HFM disease is not highly effective because there is no disease-specific prevention measure, also because of unsanitary habits and low public awareness of disease prevention and control.

36. The most common causes of deaths of children are common respiratory and intestinal infections. Respiratory infections often occur as regional epidemics including new influenza variants. They cause the bulk of child mortality from infectious diseases due to complications. Diarrheal diseases continue to be associated with lack of clean water supply and sanitation, and poor hygiene and food safety. These diseases also contribute to malnutrition and increased vulnerability of populations to other infections including tuberculosis.

37. Routine immunizations prevent many childhood infections that can easily spread across borders. Maintaining high immunization levels, despite a low burden and at considerable cost, is important. New vaccines have been introduced free-of-charge, namely hepatitis B vaccine for all newborns and Japanese encephalitis B vaccine, typhoid vaccine, and cholera vaccine for endemic areas. Rubella-measles vaccination campaigns have targeted children aged 9 months to 14 years. Vaccination against three other common and dangerous bacterial infections and rotavirus are not yet included because of costs and funds.

38. Neglected tropical diseases (NTDs) are intensely transmitted in Viet Nam and cause considerable mortality, morbidity and malnutrition. The main causes of concern in Viet Nam are various types of soil transmitted helminthiasis, and foodborne trematodiasis. While treatment is cheap, year after year insufficient funds are allocated to have an effective deworming program.

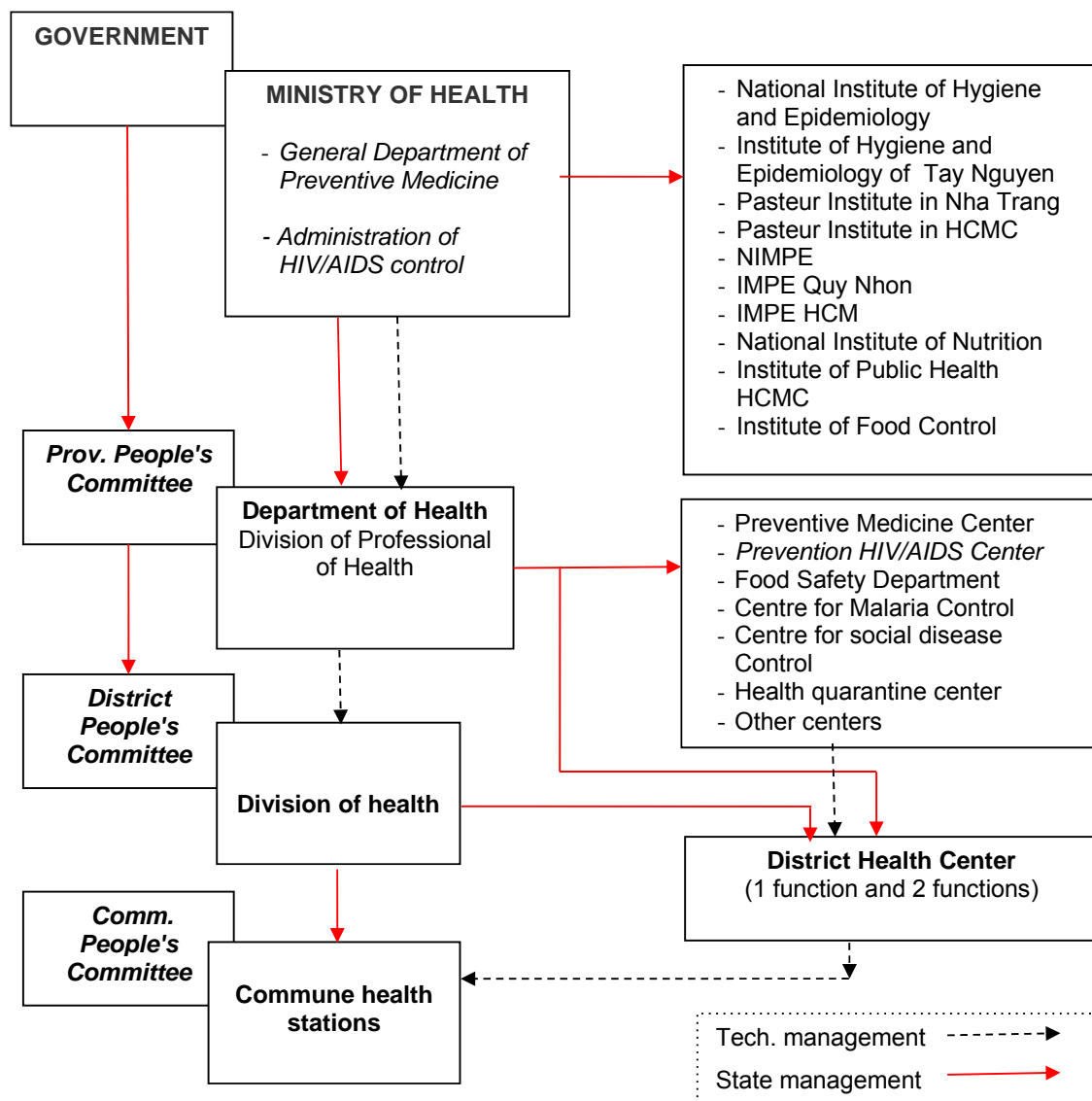
39. Hospitals typically manage drug resistant cases following treatment of HIV, malaria and tuberculosis and other infections due to drug resistance. Given indiscriminate over the counter availability of medicines and poor hygiene conditions in hospital, multi-drug resistant bacterial infections will become a major public health problem, as it has already happened in other countries with much more strict applications of use of antibiotics. Among others,

testing for drug resistance needs to be stepped up in all provinces to get a better understanding of the situation.

III. VIET NAM PREVENTIVE MEDICINE SYSTEM

40. Preventive medicine system exists at all levels, from central to local. At the central level, there are functional departments and related institutions which are directly under the leadership of MOH executing state management. At the provincial level, there are provincial centers in the field of preventive medicine in all 63 provinces providing preventive services and management. At district level, there are 708 District Health Centers (DHCs) and 10,732 Commune Health Stations (CHSs) directly implementing assigned role and function and professional responsibilities. Preventive units at different levels are designated with different roles in prevention and control of diseases and epidemics. District and commune levels directly implement prevention and control activities in community, response to outbreaks and mobilize citizens to practice prevention and control measures while the higher level units provide technical assistance and guidance.

Chart 2: Preventive medicine organizational structure



41. **At provincial level**, the National Standards for Provincial Preventive Medicine Centers were developed by MOH and approved in November 2008.²⁶ The Standards cover ten assessment indicators based on the functional, operational and organizational requirements for PPMCs acceding MOH Decision 05/2006/QD-BYT. MOH formally requested PPMCs to develop a plan for achieving National Standards in the period 2009-2015. MOH also requested Provincial Peoples Committees (PPC) to define budget allocation to support the upgrade of PPMC facilities. MOH reviewed the National Standards with all Institutes and PPMCs in 2013. Several amendments are under consideration, including the addition of a requirement for ISO 17025:2005 certification. Despite the effort, many PPMCs still do not achieve the designed standards on physical infrastructure as defined in terms of buildings and number of working rooms. Few PPMCs had sufficient equipment for CDC such as real time PCR, GEL electrophoresis machine, high-pressure liquid chromatography, atomic absorption spectroscopy machine, fluorescence microscope, GEL scanners, and stereomicroscopes. The shortage of doctors and laboratory technicians is a very common issue in provincial/district preventive medicine units. Policies to support and foster staff of preventive medicine in general, and staff working in CDC area in particular, were still lacking. There was no attraction for stable and long-time working in the preventive medicine system.

42. **Preventive medicine at district level** plays a crucial role in implementing preventive medicine activities at local levels. Currently, there are about 30% district health centers performing both preventive and curative functions. Most of these two-function DHCs focus their limited funding from state budget on curative services. There are some projects with investment in district health centers but they are scattered and not uniform. Consequently, preventive medicine capacity at district level is limited, technical equipment and human resources are insufficient compared to the actual demand, especially in poor and disadvantaged regions. Consequently, the performance of the district preventive medicine centers is limited, for example, only about 70% of suspected cases are inspected and confirmed within 48 hours; the ratio of laboratory confirmed cases is very low, at less than 10%, while the rest are only diagnosed based on clinical manifestations.

43. In terms of structure, the preventive medicine at the district level is now under a complex unified form. Among 708 district preventive medicine centers, those with both preventive and curative functions account for one third (233 districts of 13 provinces/cities) nationwide. The remaining 460 DHCs only perform one function of preventive medicine. Many DHCs in disadvantaged areas have no facility (accounting for 10% of the total districts), lack of equipment and personnel. Compared with standards by Decision 26/2005/QD-BYT dated 09/09/2005 and the Decision No. 2367/QD-BYT dated 4/7/2007, many DHCs are below standards in terms of facilities, equipment, manpower and professional competence. According to a recent study conducted by GDPM, up to 36.8% DHCs are short of staff, mainly in the Northern Mountainous Region, North Central Region. Even 60.7% DHCs in Central Highlands lack health workers. The proportion of doctors in DHCs reaches 16.5% which is considered as a sufficient number according to national standards on preventive medicine. However, among northern and highlands regions the proportion is much lower, 10% and 8%, respectively. Besides, DHCs are lacking specialized staff; most staff have general medical practice degrees, and very few are specially trained in public health, epidemiology, etc. Obviously, recruiting health staff and doctors for the DHCs is a challenge in many districts, especially in the disadvantaged areas. Another serious issue in the lack of equipment for surveillance and response at district level in both types of DHCs, especially in the Northern Mountainous Region and Central Highlands, accounting up to more than 70% DHCs.

²⁶ MOH Decision No. 4696/QD-BYT, 27th November 2008.

²⁷ ISO/IEC 17025:2005. General requirements for the competence of testing and calibration laboratories.

44. The total number of human resource for the preventive medicine system as of 2011 at all levels is about 17,000. According to the Joint Circular No. 08/2007/TTLT BYT- BNV dated 05/6/2007, an estimated demand is about 41,000 personnel. Therefore, the number is only of 42% of the demand. Thus, the shortage of staff is about 24,000, including 8,000 doctors, 4,000 public health bachelors (Source: GDPM 2015).

IV. SURVEILLANCE AND RESPONSE SYSTEM FOR COMUNICABLE DISEASES

a. Policy and Legislation

45. The Law on Infectious Diseases Prevention was passed in the twelfth National Assembly and became effective from 2008, creating a strong legal framework for activities against infectious diseases. Regarding policies, building capacity, improving performance of the surveillance system, expanding cooperation with international organizations, and other countries in the region and in the world for the prevention of infectious diseases are among top priorities.

46. National Strategy on Preventive Medicine until 2010 and orientation to 2020 was issued by Decision No. 255/2006 / QD-TTg dated 9/11/2006 of the Prime Minister with the aim of reducing the risk factors affecting community health; early detection, timely control of epidemics, preventing overwhelming epidemics. The strategy clearly states that active and pro-active prevention is a priority task to ensure equality and effectiveness in protecting, caring, and improving people's health. All citizens, especially the poor, ethnic minorities, children under six years old, social-policy groups, those living in poor, remote, border, island areas and vulnerable groups should have access to quality basic health services.

47. The government and MOH issued supporting legal documents to guide the implementation of the Law on Prevention and Control of Communicable Diseases. They include:

- Decree No. 92/2010/ND-CP regulating biosafety in laboratories;
- Decree No. 101/2010/ND-CP on health quarantine, mandatory health quarantine and special disease control measures during an outbreak;
- Decree No. 103/2010/ND-CP on border health quarantine;
- Decision No. 64/2010/QD-TTg regulating conditions for announcement of an outbreak and end of outbreak;
- Circular No. 48/2010/TT-BYT guiding the declaration, information, and reporting of communicable diseases, etc.
- Many ministerial and inter-ministerial documents which were promulgated to guide in details the implementation of national policies for preventive medicine.

48. In 2013, the Minister of Health promulgated the Decision No. 1424/QD-BYT establishing the Emergency Operation Center for prevention and control of diseases (EOC) at the GDPM with participation of relevant units within the MOH, and representatives from the Ministry of Agriculture and Rural Development (MARD), WHO, FAO, and USCDC in order to enhance the coordination, information sharing and mobilization of resources in surveillance and response to communicable diseases and epidemics. In the long term, this will be the focal point for joint management of emergency public health events affecting people's health in Viet Nam and the world. In order to effectively operate the EOC, rapid response teams were created at national, regional, provincial and district levels to ensure rapid containment of emergency public health events.

49. In response to the specific situation of emerging diseases, different steering committees were established, such as:

- In 2007, National Steering Committee for prevention and control of pandemic influenza in human with participation of 19 relevant ministries and sectors within the government. The committee established 4 sub-committees responsible for different professional areas in prevention and control of pandemic influenza in human, specifically: Surveillance and response sub-committee (the standing unit is the General Department of Preventive Medicine); Communication sub-committee (the standing unit is Cabinet Office of Ministry of Health); Medical treatment sub-committee (the standing unit is the Medical Services Administration); and Logistics sub-committee (the standing unit is the Department of Planning and Finance).
- In 2014, the Minister of Health issued the Decision No. 3265/QD-BYT on strengthening the Steering Committee for Disease Prevention and Control based on the Steering Committee for Prevention and Control of Dangerous and Emerging Diseases which had been established pursuant to Decision No. 3671/QD-BYT on 7 October, 2011 of the Minister of Health. The Steering Committee for Disease Prevention and Control includes 5 sub-committees: disease surveillance, prevention and control sub-committee; medical treatment sub-committee; communication sub-committee; logistics sub-committee; and international cooperation sub-committee.

b. Surveillance and Response Structure

50. The surveillance for communicable diseases falls primarily under the responsibility of the GDPM. In 2008, the GDPM established a National Surveillance Unit under the Communicable Diseases Control Division. The objective of the Surveillance Unit is to implement collection, analysis, interpretation and dissemination of information on communicable diseases for timely response to communicable diseases health threats.

51. Viet Nam surveillance system of communicable diseases is well organized at all levels under the structure of the Preventive Medicine system, including: Central level (GDPM), regional level (Institutes of Hygiene and Epidemiology/Pasteur/ provincial Malariology, Parasitology and Entomology Institutes, international health quarantine centers), provincial level (PPMC), district level (DHC), communal level (CHS) and all-level hospitals. The structure of the surveillance and response system is clear and consistent with operational mechanisms. Most of the provincial and district preventive medicine centers have established teams/units in charge of surveillance, including rapid response teams.

52. In each relevant units (GDPM, Hygiene and Epidemiology/Pasteur Institutes, Provincial Preventive Medicine Centers, District Health Centers), 2-5 rapid response teams were established to implement rapid response activities when being mobilized. When a new disease emerges, there is decisive coordination and active collaboration between units from all relevant sectors; thus the establishment of national rapid response teams in charge of each region is necessary. Throughout the process of prevention and control of EHF, the MOH deployed national rapid response teams to actively contribute to rapid containment of suspected cases entering Viet Nam. In addition, the Executive Board for strengthening infectious disease testing capacity in Viet Nam was founded in 2014 to consolidate and develop a network of laboratory for infectious diseases.

c. Health Quarantine

53. The complicated situation of the EID in the world such as MERS-CoV, influenza A (H7N9), and EHF, recently put health quarantine at points of entry in need to be enhanced to prevent the diseases from entering Viet Nam. Regarding socioeconomic development, the Prime Minister (PM) has recently agreed to spend development investments sourced from the State budget for nine border gate economic zones in the 2016-2020 period, including Mong Cai (Quang Ninh province), Dong Dang (Lang Son), Lao Cai (Lao Cai province), Cao

Bang (Cao Bang province), Cau Treo, Cha Lo and Lao Bao in the central provinces of Ha Tinh, Quang Binh and Quang Tri; Moc Bai (Tay Ninh province) and An Giang in the southern province An Giang. The PM proposed that 70% of the annual total budget for border gates in the 2016-2020 plan should be focusing on the 9 border gates in major economic zones. Increasing cross-border connectivity will further increase the risk of communicable diseases entering the country, and further challenge the sector in outbreak prevention and response.

54. The border health quarantine network has been established and health quarantine protocols promulgated. However, intersectoral collaboration in a number of areas is still limited, especially in transporting goods which are subject to health inspection. A recent study conducted by Health Strategy and Policy Institution (HSPI) concluded that health quarantine units currently do not fully meet requirements to detect epidemics and dangerous elements. The reason is that number and types of professional services have not been fully implemented at the gates and at the health quarantine centers/divisions. This is likely due to: (i) poor infrastructure which does not guarantee professional activities (ii) shortage of equipment, (iii) shortage of personnel in all routes, (iv) no official and practical training programs on quarantine, and (v) lack of specific guidance on tasks, coordination and responsibility of each member at the gates. Recently, MOH issued circular No. 46/2014 / TT-BYT on the process of quarantine and circular No. 15/2014 / TT-BYT guiding on health quarantine reports.

d. Health Management Information System

55. There are legal documents issued by MOH relating to the health management information system (HMIS), such as Decision promulgating the health statistic indicators; Decision promulgating statistic reporting forms by the localities; Strategy Implementation Plan for developing the health statistics in the period 2011-2020; Instruction No. 02/CT-BYT by MOH on promotion of development and application of informatics technology in health sector, etc. However, HMIS is still facing a number of challenges. These include vertical fragmentation of different components of HMIS, limited coherence between HMIS-related policies and governance structure for the implementation; lack of a national strategic plan for HMIS development; shortage in quantity and weak competence of human resources for HMIS, especially at district and commune levels; insufficient capacity development and resources for computer-based HMIS; lack of sufficient and sustainable financial and technical support for HMIS; and limited collaboration among different development partners, programs and projects, between donor-supported and government-funded programs as well as among departments of MOH. Currently, the MOH is collecting 127 indicators, including population health status, system performance, and output/activity indicators of the health sector. Most indicators are collected under periodic reporting system through a series of logbooks, report forms from commune, district, provincial and central level.

56. Up to now, most HMIS activities (data collection, analysis and reporting) are done manually, or in Excel files (in facilities where computers are available). This causes a lot of errors and duplication in the work of health statistics staff. Therefore, the MOH piloted information technology applications in their routine work as well as that of lower levels, in order to reduce the workload for health statistics staff and to increase the accuracy and timeliness of HMIS data. Data collected at CHS have not been computerized, mainly collected manually and therefore inspection and analysis of the data are difficult. Data of the national target programs and preventive medicine is often not available or hard to access by public users. Basic data using the international classification of diseases (ICD) numbers 10 and 9-CM have not been implemented uniformly in all medical establishments, and measurement of disease burden is difficult and has and limitations. Lack of data on private healthcare is also a big issue due to lack of mechanisms and monitoring.

57. *The surveillance system* generates a lot of data from multiple sources including: immediate reporting of priority diseases, routine reporting of endemic diseases, and sentinel systems. According to the current regulations on reporting of notifiable diseases, each level of preventive health authorities is required to report aggregated morbidity and mortality data on a monthly basis for the 28 notifiable diseases under the surveillance system. Besides, 11 notifiable diseases including EIDs stipulated by the MOH are required to be reported weekly. Detected outbreaks of any the 28 notifiable diseases or any EID or communicable diseases also have to be reported immediately.²⁸

58. There is no platform for integration of clinical, prevention, and lab data at any level. VAMS's data are not available to GDPM or Regional Institutes, even though the source of the data for both systems is essentially the same. Clearly, these data belong to different sections/units of the MOH (medical services vs. preventive medicine) without any synchronized form. All provincial/district preventive medicine units report data by time, locations, and subjects. As performance of the surveillance system, there is a strong compliance with Circular 48 for daily, weekly and monthly reporting of 28 diseases at each site. A high rate of these units made epidemiological maps and the trends of some disease epidemics that occur in the local areas. Given that reports should be completed and sent weekly and monthly, many DHCs miss the deadline of weekly reports, especially those in remote areas where internet access and transport are poor and difficult. It appears that there was a reluctance to report outbreaks to the preventive medicine system because of concerns about performance, for example, in the case of food borne diseases outbreaks. Districts are responsible for ensuring food safety and so they are reluctant to report outbreaks that may reflect badly on their performance of this duty, at least until they are under control. Another challenge is that many private health facilities, other sectorial hospitals/health units do not report data communicable diseases as regulated.

59. Capacity of staff in using information technology is good at provincial and district levels, however there is limited software, which is not uniform. Many medical staff do not use the software in monitoring preventive medicine activities and checking reporting cases, therefore they could not take advantage of information technology. The demand for information technology application in managing and reporting CDC requires providing equipment and training to improve the use of information technology and management software, electronic reports on the entire surveillance system and the whole health sector.

60. Software, e-CDS,²⁹ is designed to open and allow for upgrading. Via internet, users can access to the software from their computer with internet connection with their own account and ID code. The application of this software resulted in significant improvement of the efficiency of the communicable disease surveillance system, especially at the commune and district levels. When operating optimally the e-CDS system enables timely production and submission of routine reports. The system allows surveillance data to be centrally stored and readily accessed by personnel at different levels when needed. While the e-CDS system has capacity to support detailed analysis of disease data by person, place and time, regular use of this function has, to date, been limited. Facilitating use of this function requires future effort to address the barriers to systematic collection of detailed patient data at commune level for input into the e-CDS system. Moreover, when many units directly send reports at the same time, it is difficult to control the quality and authenticity of data, which can be poor due to limited skills of software users, or errors in interaction with the software. Some provinces are performing e-CDS poorly. Factors contributing to poor data quality included: (i) inadequate supervision and checking of data by higher levels; (ii) lesser attention given to data entry given the dual operation of the official paper based and e-CDS systems during

²⁸ Circular 48 /2010/TT-BYT of Ministry of Health on infectious disease reporting.

²⁹ e-CDS - Electronic communicable disease surveillance (system), developed by ADB funded project (ADB 47).

the pilot; (iii) districts applying the e-CDS software not having yet sufficient staff trained in its use.³⁰

e. Viet Nam APSED/IHR Evaluation

61. Viet Nam established an IHR (2005) National Focal Point (NFP) under the GDPM. During 2011- 2014, the NFP conducted an assessment on the implementation of the IFR (2005) in Viet Nam in collaboration with concerned ministries/sectors. In 2012, based on the results of the assessment, MOH requested for 2-year extension of fulfillment of the core capacities until 2014. In June 2014, MOH reviewed 13 core capacities as required in collaboration with WHO and other concerned ministries/sectors. Based on the assessment in 2014, the action plan for prevention and control of newly emerging communicable diseases and public health events has been developed, focusing on maintaining and strengthening 13 core capacities. Like Indonesia, Mongolia, Lao PDR and Nepal, Viet Nam has been selected as one of the Member States to provide examples of APSED's implementation.

Table 5: Assessment APSED score

No.	Core capacity	2012			2013			2014			2015		
1	Legislation	5	3	60	5	4	80	5	4	80	5	5	100
2	Coordination	14	8	57	18	15	83	18	18	100	18	18	100
3	Surveillance	23	14	61	27	18	66	27	24	88	27	24	88
4	Response	25	23	92	27	23	85	27	23	85	27	24	89
5	Preparedness	17	10	59	21	18	85	21	20	95	21	20	95
6	Communication	9	3	33	10	7	70	10	8	80	10	10	100
7	Resources	7	4	57	7	6	85	7	6	85	7	7	100
8	Laboratory	21	10	48	22	21	95	22	22	100	22	22	100
9	Points of entry	31	25	81	35	27	77	35	32	91	35	35	100
10	Zoonosis	13	13	100	13	12	92	13	13	100	13	13	100
11	Food safety	21	19	90	24	20	83	24	24	100	24	24	100
12	Chemicals	16	6	38	18	8	44	18	16	88	18	16	88
13	Radiological	16	12	75	17	11	64	17	17	100	17	17	100

Source: GDPM report, 2015

62. Generally, considerable progress across many EID-PHE capacities was made in 2014, but some areas need improvement, e.g. IPC and risk assessment. Besides, monitoring and evaluation system also needs more improvement to provide a basis for accurate assessment on ongoing progress.

63. Specifically, IHR core capacity score on 'Surveillance' has seen gradual improvement over the years. Strong legal framework, system and human capacities for reporting on communicable diseases, including guidelines for surveillance, have been

³⁰ Final Evaluation Report of Preventive Health System Support Project (ADB 47) December 2013.

established and are functional. Evidence of the well-functioning surveillance system was brought via early detection of H5N1 cases (through SVP reporting), suspected case of EHF and H7N9 (detected through event-based surveillance). Lessons learnt from recent outbreaks are (i) more efforts should be made to improve use of surveillance data for decision making, (ii) case definitions and reporting from curative to preventive systems, and (iii) private health sector participation in surveillance/reporting.

64. IHR core capacity score on '**Laboratory**' has seen improvement over the years. Legal framework, National Steering Committee and guidelines for public health laboratories are in place. Laboratory infrastructure was improved. Diagnostic capacities for prioritized diseases significantly improved, and proved adequate to develop capacities for new pathogens including H7N9, MERS-CoV, EHF. Capacity of personnel in biosafety and quality management is under ongoing efforts of further strengthening. *However, public health laboratory network needs to be strengthened under the context of less external support.*

65. Regarding IHR capacity on **Public Health Emergency Preparedness Planning 'PHEP'**, the Emergency Operations Center (EOC) has been established in 2014 to better implement surveillance, alert and response as well as preparedness. Viet Nam made efforts in planning preparedness for EHF, disease specific response plans for prioritized diseases, including H7N9, MERS CoV, EHF. MOH developed the National Preparedness and Response Plan for Emerging and Dangerous Diseases. Simulation exercises have been conducted at national and some local levels with many lessons learnt.

66. IHR capacity score on **monitoring and evaluation**, multi-stakeholder planning and review meetings was conducted annually since 2012. Core APSED performance indicators are collected, analyzed and completed. IHR questionnaires are completed as part of annual meeting agenda.

67. Since APSED is relevant to Viet Nam, it could bring about positive influences, there are, nevertheless, challenges to maintain the improvements. Government funding for the implementation of the national EID plans is constrained and requires greater domestic investment in health security. The key achievements are still dependent on external support. Staffing skills are of concern, especially at sub-national level.

f. **Summary of issues in surveillance and response**

68. The health service delivery system is currently fragmented between levels and between preventive and curative care services; integration and continuity of care are not well implemented.

69. Current surveillance of communicable diseases is dependent on clinical diagnoses from medical facilities. Some data collected in the provinces are still not continuous and systemic. Early detection of cases at the community level was deployed only in some infectious diseases. Disease information and reporting system is backward due to lack of infrastructure, equipment, and manpower. There are no national standards for disease surveillance and response.

70. There is a lack of national technical standards on testing, surveillance and prevention of infectious diseases, quality control standards for a number of technical areas such as management of mosquito spray, chemical impregnation, cosmetics testing, occupational health. There is no national standard for preventive medicine at the district level.

71. A number of communicable diseases are not tested for confirmation at provincial and district hospitals. Capacity to test common communicable diseases at provincial preventive

medicine centers is still limited. DHCs still cannot perform confirmative tests as per MOH regulations. Sample tracking and management in the laboratory system still need to be improved. After many years, the ratio of laboratories meeting national standards is still low.

72. Regarding health quarantine, the capacity to implement the IHR 2005 indicators is still weak to meet the provisions of the Charter of the IHR. Health quarantine system needs more investment in terms of infrastructure, equipment, and capacity building for human resource.

73. Preparedness plans to epidemics are in place at the central and provincial levels. The plans include regulations and norms (equipment, drugs, biological, and chemicals); and rapid response teams with full members as regulated. However, policies on epidemic announcement still lack some circulars for identifying the B-group communicable diseases. Budget preparedness plans are limited by local authority commitment. Some provinces and districts did not have separate budget sources for surveillance. The budget for outbreak detection and control does not match the actual requirements at all levels.

g. Recommendations for designing the health security project

74. The following recommendations are proposed:

- The intervention within the health security project should be focused on the district level in terms of improving capacity in surveillance and response to infectious disease. Meanwhile, investment needs to consider improving management capacity and public health event response at the provincial level and policy/legislation at the national level.
- Many district health centers are now under a restructuring process, which merges curative and preventive services into one health center. For those which are going to be merged it is necessary for GDPM to consider the investment in terms of human resources, equipment and capacity building plans avoiding overlaps with what is already available in the curative area.
- Health quarantine centers should have their capacity strengthened in detection and response to the infectious diseases found in the border gates. GDPM needs to map out the specific need of each health quarantine center to guarantee an efficient investment. This often depends on the number of crossing people, goods, and epidemiology.
- Lessons learnt from World Bank projects and other supports on simulation exercises need to be documented. Based on the situation at the borders, the health security project needs to support regional simulation exercises, which involve participation of different levels, from regional, country to local levels.
- Surveillance and response needs to be coordinated with risk communication before, during and after outbreaks. The risk communication needs to be designed and implemented in coordination with neighboring countries, developing communication materials in many languages. Mobile and direct communication models are recommended in remote areas where people have difficult access to medical and preventive services. This suggests strengthening VHWs' competence.
- IEC activities should be strengthened to increase awareness and actions among people for the implementation of disease prevention measures, especially, among the EM in the border areas. Mobilization of people should be continued to develop the movement for health cultural villages, and rural household sanitation, with

investments in clean drinking water, sanitary toilets and showers, eliminating health problems related to unsanitary lifestyles and habits or environmental pollution.

- Mechanisms to share information among stakeholders should be improved; Working group on IHR/APSED should be established. Implementation of an information sharing system should be undertaken between the provincial pairs of Cambodia, Laos and Viet Nam to organize training on implementation of IHR/APSED capacities for all implementing agencies..

V. INFECTION PREVENTION AND CONTROL ANALYSIS

75. IPC is an important strategic area of APSED that has received less attention. It has become even more important due to the emergence of drug resistant bacterial infections in hospitals. Many studies showed that nosocomial infection is one of the leading threats to the safety of patients, increasing patient mortality rates, complications, hospitalized days; use of antibiotics, antimicrobial resistance; increasing costs and medication burden for both patients and the health system. Along with the emergence of a number of diseases caused by drug-resistant organisms, or by new pathogens, hospital infection remains a problem even in developed countries.

76. The World Alliance for Patient Safety was launched in October 2004 to facilitate the development of patient safety policy and practice in all WHO member states and to act as a major force for improvement. In October 2005, the Alliance launched the first Global Patient Safety Challenge with the theme 'Clean Care is Safer Care', to bring together the WHO Guidelines on hand hygiene in healthcare with ongoing work on blood safety, injection and immunization safety, safer clinical practices, and safe water, sanitation and healthcare waste management. It emphasizes that hand hygiene is the primary measure to reduce healthcare-associated infection, which is a major area of concern in patient safety, and the spread of antimicrobial resistance.³¹

77. In a recent attempt to show the scope of the problem of patient safety, Mugrditchian and Khanum (2006) showed that Thai and Indonesian situations are similar to those in industrialized nations where it has been estimated that 10% of hospitalized patients suffer an adverse event and 5–10% acquire a healthcare associated infection.³² They cautioned that the Thai and Indonesian findings should not be extrapolated to other countries in the region. They observed that the incidence of adverse events is likely to be significantly higher in hospitals and in countries where services and accreditation programs are less well developed. They showed evidences that when compared to industrialized countries, the risk of acquiring a healthcare associated infection is estimated to be 5–20 times higher in developing countries and 3–20 times higher for neonates.

78. In Viet Nam, policies and legal documents related to IPC were issued and applied in health care facilities, including:

- Circular No. 18/2009/TT-BYT October 14, 2009 by the Minister of Health issuing guidelines for organizing the implementation of infection control in health facilities

³¹ Donaldson, L. (2005). Patient Safety: "Do No Harm", in: Perspectives in Health, The magazine of the Pan American Health Organization. (http://www.paho.org/English/DD/PIN/Number21_last.htm). 2007.

³² Mugrditchian, SD., Khanum, S., 2006. "Placing patient safety at the heart of quality in health care in south-east asia". International Hospital Federation Reference Book 2006/2007 021. <http://www.ihf-fih.org/pdf/21-24.pdf>

- Circular No. 07/2008/TT-BYT May 28, 2008 by the Minister of Health issuing guidelines on continuous training for health workers
- Decision No. 2174/QD-BYT June 21, 2013 by the Minister of Health approving the National Action Plan for combating drug resistance in the period 2013-2020
- Decision No. 3671/QD-BYT September 27, 2012 by the Minister of Health approving the technical guidelines on infection control
- Decision No. 1014/QD-BYT March 30, 2012 by the Minister of Health approving National Action Plan on strengthening infection control in health care facilities between 2012 and 2015.

79. Training programs and materials on infection control have been issued, including:

- Decision No 5772/BYT-K2DT August 30, 2012 by the Minister of Health issued a continuous training program on IPC
- Decision No 5771/BYT-K2DT August 30, 2012 by the Minister of Health issued training program on infection control for health workers at grassroots level.

80. IPC network is established in most health facilities in the country. About 90% of health facilities established IPC Council, 85% organized the network, 80% of 150-bed-hospitals had IPC wards. Regarding competence, 81% of leaders of IPC wards/units have a university and postgraduate degree.

81. Regarding training, health facilities collaborate with the Regional IPC Association to implement new training and refresher training courses for their facilities. However, the proportion of health staff receiving training on IPC is quite low.

Table 6: Training on IPC for heads of IPC ward/unit in hospitals

	Trained (%)	Not trained (%)
By levels	64,0	36,0
National	87,1	12,9
Provincial	66,3	33,7
District	58,9	41,1
Private	66,0	34,0
Sector	60,0	40,0
By regions	64,0	36,0
Northern mountainous area	46,0	54,0
Red river	47,8	52,2
Central	76,5	23,5
Highland	53,8	46,2
Mekong Delta	65,4	34,6
Cities	71,5	28,5

Source: Data from Administration of Medical Services 2015.

82. The proportion of hospitals performing quarter surveillance of hand hygiene compliance among staff is quite low, 47.5% in 2015. The proportion of hospitals having hand-washing sink/beds at the department is also low, 31.1%, and the proportion of hand-washing sinks available in front of patient rooms and public areas is only 38%.

83. Findings from visited provinces also showed the same issues as in the country. Some indicators are even worse. Overcrowding at the provincial hospital in the selected provinces is becoming more problematic. For example, in Tay Ninh province, 70% of the

total number of dengue cases entered the provincial hospital in 2014. It suggests that most patients seek services at provincial hospitals for all of their illness.

84. Patients and their caregivers in general, ethnic minority people in particular, do not have behaviors keeping hospital hygiene and hand-washing. Therefore, the hygiene in the clinical units is a problem for the hospitals. Besides, installing a hand-washing area in aging health center and hospitals may be difficult due to the old design.

85. In the district hospitals, IPC hardly meets common standards of MOH regulations. Awareness and understanding of hospital leaders and managers on IPC is very limited, mainly taking the priorities of waste treatment. Some IPC staff in the visited hospitals even did not have basic concepts of infection control at the hospital. Welcoming and dispatch of patients systems of patients do not meet the standards; many hospitals even do not have separate consultation rooms for infection diseases.

Table 7: Some IPC related indicators from selected project provinces

No.	Indicators	%
1	Monitoring of prevalence of nosocomial infection in 2015	
	Provincial hospitals	15.3
	District hospitals	6.3
2	Monitoring of environmental microbiology at high risk areas in 2015	
	Provincial hospitals	52.5
	District hospitals	26.6
3	Monitoring of drug resistance in 2015	
	Provincial hospitals	7.1
	District hospitals	2.1
4	Liquid waste treatment systems meeting requirement	
	Provincial hospitals	58.5
	District hospitals	59.8
5	Each department has at least 1 isolation room	
	Provincial hospitals	58.5
	District hospitals	47.2
6	Percentage of hand washing sink / beds in the entire hospital ward $\geq 1/10$	
	Provincial hospitals	59.6
	District hospitals	40.1

Source: Assessment of 5-year implementation of circular 18/2009 / TT-BYT

Summary of issues

86. Summary of issues is as follows:

- Awareness of leaders, managers and health workers of health facilities on IPC is unclear, policies to attract staff are unsuitable.
- Organizational system has not been well developed. In the country, there are still 10% of health facilities which have not established IPC Councils, 15% have no IPC network; 20% of 150 bed-hospitals have not established IPC wards; 33% established but not yet appointed heads of wards; nearly 20% of the heads of wards/team have

college degrees, which is yet to meet the requirements. Only 71.3% of 150 bed-hospitals established a monitoring network within health facilities. This suggests that the current hospitals have not paid adequate attention to the monitoring of infection.³³

- Investments in facilities and equipment for IPC is inadequate. About 40% do not have adequate facilities with at least one isolation room as regulated for clinical departments; 46.5% hospitals do not have standard central sterilizing unit, 40% medical facilities do not meet the requirement of 1 washbasin/10 in-patient beds; hand antiseptic in the patient area is not available in 57.6% of medical facilities.
- Human resource remains weak and inadequate. Most staff in charge of monitoring IPC have not been trained in IPC monitoring; about 50% of network staff have not been trained. Most medical facilities do not have 1 supervisor/150 patient beds.
- To date there is no system, program and curriculum in schools/universities on IPC; no standard national curriculum for IPC training; in 3 regions there is no standard training center.
- There is still lack of technical guidelines on IPC (currently only 6 guidelines were issued in 2012).
- The national monitoring system has not been well developed. There is a need to develop monitoring indicators and reporting system, tools for data collection and monitoring software.
- Hospital infections in Viet Nam have not been adequately studied. There were only a few numbers of cross-sectional surveys. Information on IPC in health facilities is rarely shared and published.

Recommendations for designing the GMS Health Security project

87. In the framework of the GMS Health Security, it is recommended to support MOH to strengthen institutional capacity in IPC at national level and implementation capacity at provincial and district level. In particular, the following is recommended:

- To support MOH to develop technical guidelines on IPC, procedures to implement IPC in hospitals, build and issue regulations on IPC, including criteria for designing a hospital, a standard list of equipment for different levels.
- To support capacity building of three centers for IPC training in three regions: North, Central and South.
- To promote communication on infection control towards achieving the goal of 100% of hospitals implementing communications programs on IPC (via website, posters, flyers, etc.) taking into account local conditions and characteristics.
- To organize training; transfer the software, tools and systems for the central data hub at MOH, regional health care facilities (software was made through a collaboration between WHO and Administration of Medical Services).
- To implement monitoring environmental microbiology (water, air, surface), in areas with high risk of infection (operating rooms, intensive care units, medication dispensing rooms, infusion rooms);
- To provide adequate personal protective means of high quality for health staff, chemicals for sanitation and hygiene, disinfection equipment.
- To improve capacity through training courses on IPC in the following subjects:
 - Heads, vice heads of IPC units to be professionally trained on IPC, in the universities on health science
 - Professional IPC training program for officials, staff in charge of infection control in provincial and district hospitals

³³ 2015 Assessment of 5-year implementation of circular 18/2009 / TT-BYT.

- Training of trainers and roll out training for all employees working in all health care facilities on infection control
- All health care facilities to implement appropriate forms of training/education to guide patients, visitors to prevent hospital infections.

VI. PROJECT SCOPING

a. Key Features

88. The overall drivers of the project are (i) to prevent or control emerging infectious diseases and other infectious diseases of regional importance in a timely manner, (ii) to enable the Viet Nam diagnostic system to provide accurate results in a safe and timely manner, thereby improving the health status of patients and providing value for money and (iii) to reduce the risk of spreading of highly infectious diseases, nosocomial infections and drug resistance by improving biosafety.

89. The project builds on Viet Nam's commitment to regional cooperation in the context of GMS and ASEAN, and for universal health coverage. The project will support the implementation of regional disease control strategies by addressing current gaps based on evaluation of APSED and national disease control legislation and strategies.

90. The project also builds on the government's plans to integrate district health services to make these more effective and efficient. Currently, district preventive medicine centers, many of which were provided with new facilities from state bonds, are underused. A major investment is earmarked for quality improvement and integration of preventive and curative district health services.

91. While Viet Nam has a good coverage of health services, vulnerable groups like migrants and remote ethnic groups, while exposed to infectious diseases, use services much less, thereby constituting both a risk for themselves and for the general public. For Viet Nam to improve its public health security and achieve universal health coverage, it has to reach out these communities through its basic network of hospitals, district health centers commune health stations, and village health workers.

92. These communities are likely to have a high burden of communicable diseases including HIV, tuberculosis, malaria, dengue, and NTDs, while accessing services less. Engaging these communities for prevention, surveillance and response provides an opportunity to improve case finding and treatment of these conditions using existing disease control programs in nearby health facilities.

93. MOH has provided large quantities of laboratory equipment, laboratory supplies like reagents and point-of-care tests for rapid diagnostics which were inadequate, causing inefficient use of past investment. While this should be financed by the government's own budget, the project should assist in bridging these expenditures until government's own allocations have improved.

94. The project should help finance gaps in current preventive health services. The government already provides the bulk of financing for health services. MOH noted that provinces have already been supported, and prioritizes border districts and proposed to cover a large number of border districts with basic investment.

b. Indicative Project Scope

95. The proposed **project goal** is to strengthen GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities,

(ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year, and (iii) increased use of public health services in border areas by MEVs. The design and monitoring framework draft is in appendix 3.

96. The proposed **project outcomes** are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas.

97. The proposed **project outputs** are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases.

98. The proposed **project targets** 250 districts in 36 provinces along the borders and economic corridors with China, Lao PDR and Cambodia. Selection of the project provinces is based on (i) poverty status, (ii) health and health services, (iii) regional priority clusters, and (iv) existing support from other partners.

99. The Project components are:

(i) **Strengthened regional, cross-border, and intersectoral CDC.** MOH has made progress with regional information sharing and cross-border cooperation for CDC. However, this needs to be mainstreamed and formalized. In addition, some groups of MEVs that are more likely to get and spread infectious diseases are not using regular health services. Under this component, it is proposed that the project (i) supports regional, cross-border, and inter-sectoral information sharing and coordination of outbreak control among GMS countries, (ii) develops regional disease control strategies and evidence-based CDC, and (iii) improves CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for joint planning and monitoring; and outreach and community mobilization to reach and engage MEVs.

(ii) **Strengthened national disease surveillance and outbreak response.** MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis is strong. However, the system needs to be further computerized and extended to communities by employing syndromic reporting. Linkages or integration among surveillance systems will also be improved. MOH also needs to improve capacity for disease outbreak response. Under this component, it is proposed that the Project supports (i) syndromic reporting at community level, (ii) web-based reporting including information technology support, (iii) integration of surveillance systems, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport, and (vi) improving screening and quarantine capacity at border posts of entry and international quarantine centers. Support is needed for system design, computers, training, and vehicles and equipment for outbreak control.

(iii) **Improved laboratory services and hospital infection prevention and control.** District facilities are unable to comply with internationally acceptable levels of biosafety or to guarantee the accuracy of their laboratory testing. Underlying problems are substandard training of laboratory staff, lack of quality control, and insufficient facilities, equipment, and supplies. The quality assurance system is in a nascent stage, and there is no national laboratory audit system. Nosocomial or hospital-acquired infections are becoming a major public health problem. Under this component, it is proposed that the Project supports (i) improving quality assurance, (iii) in-service training, (iv) improving district laboratory services, and (iv) equipment and training for infection control and case management of dangerous diseases.

c. Indicative Management Arrangements

100. Of the total estimated project costs of \$84.0 million, ADB is requested to finance \$80.0 million through its ADF soft loan window including taxes. The government will finance \$4.0 million as counterpart funds for project management. The project is proposed to be financed under the umbrella of the GMS economic development program supported by ADB, with two thirds of funding coming from the regional set-aside, and as such requires to be regional in order to be eligible for this type of ADB financing.

101. The Ministry of Health, the EA, is represented by the General Department of Preventive Medicine (GDPM). The Director General (DG) of GDPM has been nominated as the Project Director, and reports to the DG of GDPM and the MOH Steering Committee. GDPM will provide day-to-day project management, regional cooperation, cooperation with provinces and concerned departments and institutions, and liaison with ADB and other partners. The Medical Services Administration, the National Institute of Hygiene and Epidemiology (NIHE), the Institute of Hygiene and Epidemiology in the Central Highlands; the Pasteur Institutes of HCMC and Nha Trang; and 36 provincial health departments will serve as Implementing Agencies. MOH will continue using the CDC2 Project Management Unit (PMU) in GDPM for project administration, coordination and implementation.

d. Safeguards and Risks

102. The proposed project's gender categorization is "effective gender mainstreaming". A gender strategy and action plan has been prepared and a gender expert is to be engaged. Among others, active engagement of the Viet Nam Women's Union is proposed to mobilize communities and reach at risk groups.

103. Ethnic minorities in the proposed project areas will be positively affected given the type of project activities. The proposed project is initially categorized B for indigenous people because of the risk that intended project benefits for MEVs are not realized. A Chief Technical Advisor (CTA) will be engaged to help mitigate this risk.

104. The proposed project is initially categorized as B for environment, as it involves improving laboratory and hospital waste management. Each province will need to prepare an environmental management plan.

105. The project will not entail land acquisition. The proposed project is initially categorized C for involuntary resettlement. A resettlement framework has been prepared in case there is any change of scope.

106. There are three technical risks: (i) the large number of targeted provinces (36) and targeted districts (250), (ii) insufficient progress in regional cooperation, and (iii) the risk of insufficient focus on MEVs. The project performance will to a large extent depend on the capacity of the PMU in GDPM.

107. The financial management assessment (FMA) was conducted in March, 2016 in accordance with ADB's *Guidelines for the Financial Management and Analysis of Projects and the Financial Due Diligence: A Methodology Note*. The FMA concluded that the financial management risk was moderate. Hence, a financial risk management plan needs to be prepared. To ensure that loan proceeds are disbursed in accordance with ADB's *Loan*

Disbursement Handbook, online training for project staff on disbursement policies and procedures is available.³⁴

108. The procurement risk assessment concluded that procurement risk was moderate. Provinces lack capacity for procurement of laboratory equipment. Accordingly, all major procurement will be done centrally. Provinces will do the repairs of facilities from their own sources, as counterpart contribution, and procure their own laboratory supplies and reagents. International consulting services to mitigate these risks will need to include laboratory and procurement experts.

109. Overall, the proposed project is considered to be low to medium-risk for Viet Nam in terms of (i) technical investments, (ii) safeguard categorization B or C, and (iii) good cooperation and support for provinces and partners. It may be classified as moderate to high risk for administrative aspects in view of MOH staff constraints.

VII. CONCLUSIONS AND RECOMMENDATIONS

a. Conclusions

110. Southeast Asia is an epicenter of EIDs and other diseases and drug resistance of regional relevance with potentially major health and economic impact. Regional interventions are required for communicable diseases that rapidly spread across borders or need regional cooperation for their control. Countries in the GMS are committed to build resilient national health systems and strengthen regional cooperation for the control of EIDs based on the IHR and APSED.³⁵ Collecting information from government, field visits and partners, the consultant noted that, while most IHR core capacities are in place, there are gaps that do not show in current evaluation instruments. For other diseases of regional importance, even the better funded programs for immunization and the control of HIV/AIDS, tuberculosis and malaria do not cover the entire population.

111. To achieve regional health security requires a national health security system, national health system capacity and regional cooperation to be in place. While at country level there is already a standardized mechanism led by WHO to achieve the minimum core capacity requirements, this is centered around MOH core capacities, but with less attention for participation with other countries, sectors, and community. In particular, more effort needs to be made in regional cooperation. Regional cooperation can also have benefits in terms of staff motivation, knowledge sharing, and leveraging support.

112. This rather long-term regional capacity building scenario is complicated by disturbing new information on regional diseases. Drug resistance may undermine treatment of HIV, tuberculosis and malaria, not only affecting patient survival, but allowing easier spread of the diseases. More disturbing information comes from the recent EHF outbreak in West Africa, where patients were found to be infective long after their recovery, and continued to harbor the virus in eyes and testis. This implies that people who had EHF can potentially cause a new outbreak much later. This may also be the case for other EIDs. At the same time, there is no national or even global surge capacity for a major epidemic. The implication is that absolute priority should be given to early identification of any suspected outbreak at community level using syndromic reporting, in addition indicator-based surveillance in health facilities, screening and registration of mobile people, laboratory biosafety, hospital IPC, isolation of suspected cases, and protection of staff and family.

³⁴ Disbursement eLearning. http://wpqr4.adb.org/disbursement_elearning.

³⁵ World Health Organization. *International Health Regulations*. 2005. Geneva. WHO South-East Asia Regional Office (SEARO) and Western Pacific Regional Office (WPRO). *Asia Pacific Strategy for Emerging Diseases (APSED)*. 2010. Manila.

113. ADB is a financing institution with limited staff capacity and works closely with the World Bank on governance and WHO, IOM and other UN agencies on technical matters. ADB brings regional and multisectoral experience, and has been supporting the GMS Economic Development Program and has gained considerable experience with GMS CDC projects. ADB has substantial experience in the Viet Nam health sector and ADB health projects in Viet Nam have been low risk and satisfactory in terms of implementation.

114. Given these challenges, opportunities, risks, and constraints, the PPTA team carried out sector analysis to identify priorities for improving regional health security and CDC of regional relevance. Based on the initial project scope, proposed priority areas are regional cooperation and knowledge management, disease control for MEV, broadening and computerizing the surveillance and response network, improving district laboratory biosafety and quality, and rolling out IPC.

115. In terms of institutional capacity for the proposed project outputs, GDPM is capable of managing the surveillance and response elements including regional cooperation. VAMS has a program in place for rolling out IPC, and NIHE and Pasteur HCMC are technically competent in improving laboratory services. The main project specific constraints is perhaps MOH staff availability. There will be staff constraints in rolling out various programs for surveillance, laboratory, and IPC. Technical challenges in surveillance and response are to harmonize information and control strategies in the GMS, increase cross-border cooperation and border control, reach MEVs in border areas and along economic corridors, integrate national surveillance systems, and engage the private sector.

116. A major project risk is that MEVs in border areas are not being reached as the priority target population. Another project risk is that procured laboratory equipment is not based on needs and capacity of districts, and of poor quality. Procurement and financial management risks are considered moderate. A project management unit (PMU) is proposed to support GDPM with technical and administrative matters.

117. The IHR assume that a basic health system providing UHC is in place to build on. Viet Nam has an extensive network of health services with substantial staff resources. It needs to focus on reaching MEVs that do not access public health services including migrants in labor camps and ethnic minorities in remote areas.

118. IHR/APSED implementation is insufficiently mainstreamed among departments and sectors as part of broader disaster preparedness. IHR/APSED implementation lacks transparency in terms of status of IHR/APSED implementations, and lacks a comprehensive program approach, combining various action plans of MOH and WHO, that would help promote collaboration, improve know-how, explore synergies, mobilize resources, and address implementation risks.

b. Recommendations

119. The sector analysis supports the proposed project scope as it responds to major health and economic threats, is based on IHR/APSED, supports government priorities, supports MOH policy and plan, supports reaching out to those not being reached as the main concern of public health security and tie to UHC, reflects integration of CDC under one umbrella to improve sector efficiency and effectiveness in anticipation of expected changes in aid funding, and proposes mitigating actions for identified implementation risks.

120. It is recommended that the Project has a strong focus on neglected border areas, meaning those border areas where there are no government or NGOs providing services. The government plans to use its own district mobile teams to improve outreach in these areas.

121. In terms of the proposed project outputs, GDPM is capable in managing the surveillance and response elements including regional cooperation, VAMS has a program in place for rolling out IPC, and NIHE and Pasteur HCMC are technically competent in improving laboratory services. The main concerns are implementation capacity constraints and insufficient participation of WHO, provinces and other stakeholders. GDPM is encouraged to adopt a participatory project implementation approach. It is also proposed that NIHE and Pasteur HMC jointly develop laboratory quality assurance and audit systems, which is technically more challenging and will require technical assistance of WHO and other agencies.

122. Given human resource constraints and financial management and procurement risks, a PMU is proposed to facilitate engagement of contractual staff and administrative, technical, and field support. Further consultation with provincial health teams, beneficiaries and other institutions will be needed to detail project design and participation.

c. Preparatory Work

123. Data collection involved (i) review of sector reports of MOH, institutions, regional networks, and partners, (ii) field visits to a sample of targeted provinces to collect information on the propose scope, and (iii) discussion with government and partners. Assessments used inspection, checklists, semi-structured interviews, and group discussions.

124. The project activities and implementation arrangements need to be planned in more detail, and included in the MOH and provincial annual planning and budget cycle so as not to delay the project upfront. The first annual project plan and budget should be prepared in advance. Preparation of any required legislation or SOPs should also start as early as possible. Provincial health offices will need to initiate a participatory planning process with districts, including mapping of MEVs, to determine specific project activities for MEVs based on local priorities. In particular for procurement of laboratory and hospital equipment, more detailed assessment will be required at the project start.

125. Gender, safeguards and risks assessments are in line with current sector views. Project gender, safeguards, and risk mitigation plans have been prepared, for endorsement by MOH and provincial health offices. Each provincial health office will carry out site specific Initial Environmental Examinations (IEEs) for its health facilities to receive project support according to ADB's environmental policy. MOH will also hold site specific public consultations with potentially affected groups. Each provincial health office will prepare an environmental management plan (EMP) based on proposed state/region project activities. The EMP will be submitted to MOH, other related government agencies, and ADB for review and concurrence.

Appendixes

1. Health Sector Profile
2. Access to health care services
3. Basic province health data
4. Problem Tree
5. Results-Framework

Appendix 1: HEALTH SECTOR PROFILE

Table 1: Basic health indicators, Viet Nam, 1990–2015

Indicators	1990	2000	2010	2014	2015 goal
Maternal mortality ratio (per 100,000 live births)	139	81	68	49	35
Infant mortality rate (per 1,000 live births)	44.4	30.0	15.8	14.9	14.8
Child mortality rate (per 1,000 live births)	58.0	42.0	23.8	22.4	19.3
Malnutrition rate under 5 years (underweight) (%)	38.8	26.7	17.5	14.5	15.0
HIV/AIDS prevalence (%)			0.3	0.3	

Source: Joint Annual Health Review 2014, World Bank Indicators (for MMR and malnutrition 1990, 2000).

Table 2: Basic health indicators, 1990-2015

					Poverty Rate
Red River Delta	74.3	13.2		10.2	8.3
Northern midlands and mountains region	70.4	22.2	33.9	19.8	39.2-24.3
North Central and Central Coast	72.5	17.0		17.0	22.7-17.3
Central Highlands	69.5	26.1	39.5	22.6	22.5
Southeast	75.7	9.1		8.4	2.1
Mekong River Delta	74.4	12.0		15.0	13.5
By Residence					
Urban	75.8	8.7	13.1		6.0
Rural	72.0	18.0	26.9		27.0
National average	73.1	14.9	22.4	14.5	20.7

Sources: MOH. 2015. Joint Annual Health Review 2015, based on data from General Statistics Office (2015). Summary report on major findings from midterm Population and Housing Census 1/4/2014. Thanh H Et al. International Institute for Environment and Development. human settlement working papers. 2013. poverty in urban areas-40: urban poverty in Viet Nam – a view from complementary assessments.

Appendix 2: ACCESS TO HEALTH CARE SERVICES IN VIETNAM

1. Access relates to the presence or absence of economic, physical, cultural or other barriers that people might face in using health services. Each commune of 3,000 to 10,000 inhabitants has a commune health station, sometimes with a medical officer and always with paramedical staff. The distribution of health facilities and human resources across geographic areas allows for access to most rural areas.

2. The average distance to the nearest district and provincial hospital across the whole population is 13km and 42km, respectively. The mean distance to the nearest district hospital ranges from 7km in the Red River Delta to 24km in the Northeast region. The mean distance to the nearest provincial hospital ranges from 22km in the Red River Delta to 70km in the northwest region. Kinh and Hoa (ethnic majority) populations tend to live substantially closer to both district and provincial hospitals than members of ethnic minorities (mean distance to district hospital 10.9km vs 21.9km; mean distance to provincial hospital 35.0km vs 72.0km).¹ Hospital access is further affected by road conditions, availability of transport, and transportation costs.² While overall utilization of health facilities increased from 2002 to 2010, use of these services by lower income quintiles has remained static. The greatest increase has been in the highest quintile.³

3. Accessibility in terms of human resources is reflected in availability of health care staff or the ratio of health care professionals to the population. Due to shortages of administrative management staff, a number of highly skilled health professionals in Viet Nam have moved to higher positions of administration. The loss of skilled professionals from the public to the private sector is a further concern. This is due in large part to the much higher salaries offered in private clinics, compared with the public sector. This issue is more widespread in the larger cities. For this and other economic reasons, it is becoming very challenging to recruit well-trained new health care staff.⁴

4. The transition from a health system in which the Vietnamese government provided free health care to a system increasingly relying on out of pocket expenditures at the point of treatment has resulted in financial barriers that prevent the poor and near poor from accessing health care. To strengthen the government's response to this issue, Decision 139 of the Prime Minister of Viet Nam in October 2002 established the Health Care Fund for the Poor (HCFP). The decision consolidated previous schemes for the poor, such as free health care cards, into one single scheme. The purpose of the fund is to provide free access to services and financial protection to all poor people who cannot afford to pay user fees at health facilities. Coverage includes drugs on the essential drug list, but not non-prescription drugs bought from vendors. Services offered by private providers were also not included in the scheme. Other health services such as TB Direct Observation Therapy and antiretroviral drugs for treatment of people living with HIV/AIDS are also provided free.⁵

5. By 2012, almost one million households faced catastrophic health spending (health spending exceeding 40% of ability to pay⁶), and over half a million households (2.5% to

¹ CEMA Hanoi, *Poverty Situation Analysis of Ethnic Minorities in Vietnam 2007-2012 Key Findings from Quantitative Study SUB-PRPP Project*. Dec. 2013.

² Viet Nam Health and Living Standards Survey, 2010.

³ Viet Nam Health and Living Standards Survey, 2010.

⁴ Ministry of Health *Joint Annual Health Review 2008 Health Financing in Viet Nam*, Viet Nam Health Partnership Group

⁵ WHO. *Case Study On Health Care for The Poor in Vietnam: How Evidence and Politics Came Together* Nguyen Hoang Long et al. Meeting On Evidence-Informed Policy and Action to Promote Health Equity Phnom Penh, Oct 16-18, 2007

⁶ The definition of catastrophic spending varies by country, but is commonly expressed as a percentage of total non-food household spending for a given year. In the case of Viet Nam this is commonly given as 40%. In

4.1% of the population) slipped into poverty because of medical spending. The proportion of health spending for self-medication and private sector services (not covered by health insurance) and use of costlier referral services remain high. Co-payments are still a financial burden for low-income households. Informal payments and payments for non-treatment costs related to healthcare seeking remain high. The household out of pocket payment share of total health spending in Viet Nam is much higher than the WHO recommendation of 30-40%.⁷ Household out of pocket spending on health accounts for from 8.3% to 11.0% of household capacity to pay and approximately 4.6% to 6.0% of total household expenditure.⁸

6. Public health spending for ethnic minorities, the poor and children under age of six has been increasing since around 1998. The proportion of the total population without any medical insurance decreased from 86% in 1998 to about 30% in 2014, with almost 100% coverage of the poor and ethnic minority groups, who receive subsidized insurance premiums and are not required to make any copayments for government medical care.⁹ This has significantly reduced out of pocket health spending among the poor. The revised Law on Health insurance¹⁰ allows the poor and ethnic minority people living in disadvantaged areas to bypass the commune to seek care at the district hospital, or to seek inpatient care at provincial or central hospitals and still receive health insurance reimbursement. In 2016, this policy will allow all patients covered by government health insurance to seek health care at any district or commune health facility within the province and still receive full reimbursement.

7. Differences exist in financial access among different cohorts. Supply-side subsidies for recurrent costs of medical facilities are gradually being replaced by demand-side subsidies for users of health services through state budget funding of social health insurance premiums.¹¹ The near-poor have a 30% premium share and 20% co-payment. Only about 25% of the near poor have been enrolled in health insurance. Utilization of health services among the poor is lower than for other income groups, leading to a vicious circle of underfunded services, with only an average 75% of funds contributed to health insurance for the poor used to reimburse facilities (falling to as low as 40% in some localities).¹² Progress in issuing health insurance cards for children under age of six and the elderly over 80 is still slow. In 2011, about 19.7% of children under age of six were not issued with health insurance cards, notably, children from ethnic minority groups or those living in locations other than where they have permanent household registration.¹³

8. Ethnic minority groups represent a larger share of the poor in Viet Nam. As such, they account for a proportionately larger share of population who are granted free health care cards. Having a free healthcare card does not, however, necessarily mean better quality health care for those holding these cards. Ethnic minority communities tend to be located in areas with less access to health facilities than areas with high ethnic majority populations. This accounts, in part, for their lower health care expenditure. In addition, it has been noted

Myanmar, 30% is more common, perhaps because average income is lower. See World Bank Quantitative Techniques for Health Equity Analysis. Technical Note # 18.

⁷ WHO *Health systems financing: the path to universal coverage World health report 2010*.

⁸ Joint Annual Health Review 2014 Health Financing in Viet Nam Ministry of Health, Viet Nam Health Partnership Group.

⁹ 24 September 2008, the MOH and Ministry of Finance issued Joint Circular No. 10/2008/TTLT-BYT-BTC Circular No.09/2009/TTLT-BYT-BTC Guiding the Implementation of Some Articles of the Law on Health Insurance, and Decree No 62/2009/ND-CP. Hanoi: Government 2009.

¹⁰ Dung, N. Health Insurance Department, MOH. 2010. *Social Health Insurance in Viet Nam*. Hanoi.

¹¹ The World Bank HPN Series Health Financing and Delivery in Vietnam Looking Forward. Samuel S. Lieberman, Adam Wagstaff. 2009.

¹² WHO. *A Health Financing Review of Viet Nam with A Focus On Social Health Insurance* Tran Van Tien et al. August 2011.

¹³ Joint Annual Health Review 2014 Health Financing in Viet Nam Ministry of Health, Viet Nam Health Partnership Group.

that the treatment readily accessible to poor ethnic minority people at commune health centers is frequently deficient and constrained by expenditure ceilings. Language barriers and differences in cultural traditions and perceptions have been offered as explanations to discrepancies in quality of care. For example, there is no health information material at most local health stations written in any minority language.¹⁴

9. Due to the lower degree of financial risk protection, the medical cost burden of illness including communicable diseases falls largely on the poor. In addition, epidemics such as avian influenza often result in unreimbursed poultry culling, the cost of which once again disproportionately affects poorer households. Infections such as HIV, malaria, and tuberculosis tend to be more prevalent among the poor than the wealthier.¹⁵ The costs of illness also include income lost as a result of disease-related morbidity and mortality. Epidemics adversely affect labor productivity by inhibiting the movement of labor within and between countries.

10. Compared to national averages, ethnic minority groups have experienced a much slower pace (3.7%) of increased income and improvement in other related indicators such as education, health, housing, sanitation and water.¹⁶ In 2012, the general poverty rate for ethnic minority groups was 45%, about five times that of the ethnic majority population. The extreme poverty rate for ethnic minority groups was 29%, more than nine times greater than amongst the majority population. While the general poverty rate for the ethnic majority groups went down by 71% from 1993 to 2006, the general poverty rate for ethnic minority groups declined by only 42% in the same period.¹⁷ Similarly, extreme poverty rates decreased by 85% among the majority population but decreased by only 48% for members of ethnic minorities from 1993 to 2006.¹⁸ Comparative rates of poverty between minority and majority ethnic groups are estimated to have increased threefold or more between 1993 and 2006.¹⁹

11. In response, the Government of Viet Nam in 2011 issued Resolution 80/NQ-CP²⁰, providing new directions for sustainable poverty reduction for 2011-2020. The Resolution aims to accelerate poverty reduction in the poorest districts, communes and villages of the country, by setting poverty reduction target of 4% per annum in these areas (compared to the national target of 2%), and by prioritizing mobilization of resources and support to these areas. The NTPSPR (2012-2015)²¹ was approved in early October, 2012 to accelerate poverty reduction and improve livelihood in these areas. The Government has identified poor households to improve targeting of investments, with female-headed households considered among the more vulnerable.

12. The male-female sex ratio has increased to almost 112 due to female feticide. On this basis alone, it is predicted that Viet Nam will have a shortage of 2.3 to 4.3 million women by 2050.²² If the exportation of brides continues, this figure may increase. It is likely to result in

¹⁴ Global Health Action. 2013; 6: 10. *Ethnic minority health in Vietnam: a review exposing horizontal inequity* Mats Målqvist et al.

¹⁵ WHO *Macroeconomics and Health: Investing in Health for Economic Development Report of the Commission on Macroeconomics and Health* 2001.

¹⁶ CEMA Hanoi, *Poverty Situation Analysis of Ethnic Minorities in Vietnam 2007–2012 Key Findings from Quantitative Study Sub-PRPP Project* - Dec. 2013.

¹⁷ CEMA Hanoi, *Poverty Situation Analysis of Ethnic Minorities in Vietnam 2007–2012 Key Findings from Quantitative Study Sub-PRPP Project* - Dec. 2013.

¹⁸ CEMA Hanoi, *Poverty Situation Analysis of Ethnic Minorities in Vietnam 2007–2012 Key Findings from Quantitative Study SUB-PRPP Project*. Dec. 2013.

¹⁹ CEMA Hanoi, *Poverty Situation Analysis of Ethnic Minorities in Vietnam 2007–2012 Key Findings from Quantitative Study SUB-PRPP Project*. Dec. 2013.

²⁰ Government of Viet Nam. *Resolution 80/NQ-CP*. 2011.

²¹ Government of Viet Nam. *The National Targeted Programme for Sustainable Poverty Reduction 2012–2015*.

²² MOH. 2015. JAHHR.

major hardship for women and social and economic instability.²³ As yet, there are no serious national attempts to redress this situation.

13. Rural men and women are increasingly engaged in migrant labor. Internal migration is population each year, and one out of four households. This creates important social and economic shifts that are insufficiently taken into account in current government policy. The formation of economic zones in the south and the north are key catalysts for internal migration. The driving force of migration tends to include not only employment, but also urban facilities such as private education and health services. These factors may contribute to longer-term poverty reduction.

14. Viet Nam is unique in the GMS in terms of having specific programs for poverty reduction and social inclusion targeting vulnerable groups. The Prime Minister's office directly leads government efforts for poverty reduction and social inclusion through the various ministries. The main thrust is through the NTPSPR. The National Assembly approved the most recent NTPSPR (2016-2020) in 2015. The Ministry of Planning and Investment (MPI) is responsible for the overall management and supervision of all NTPs, in cooperation with the other implementing ministries, as well as the Committee for Ethnic Minorities. Program 135 is a specific program to invest in areas with ethnic minorities, and may be more extensive than the related NTPs in some provinces. The Government supports several institutions for poverty analysis and policy development.

15. At provincial, district and commune level, the People's Committee plays a key role in poverty reduction and social inclusion. As a one party state, Viet Nam relies on the Women's Union, the Youth Union, The Farmer's Association, the Fatherland Front and other state sponsored organizations for advocacy, social mobilization and community participation. There are regular biannual meetings of the provincial, district and commune people's counsels where voters - through representatives - present their views and questions on a variety of topics. Provincial and district authorities organize discussion forums and specific mass mobilization days for various public health priorities, and community appreciation and awards.

16. MOH is responsible for the provision of public health services and health insurance for the poor and other vulnerable groups. Health programs and projects are implemented through provincial and district health offices, and for some up to village health committee and village health workers. The Government has not encouraged non-governmental organizations (NGOs) or the private sector to play a major role in the rural health sector and discourages their engagement in sensitive border areas. Some NGOs work in assisting subsector development with limited geographical coverage.

17. MOH has limited capacity to access hard-to-reach communities. Reasons for this include financing and transport constraints and low travel allowances. Other aspects may also play a role, such as concerns about efficiency (focus on low hanging fruits in view of overall financial constraints), concerns about staff security, and concerns about language challenges and lack of interest of targeted communities. MOH has struggled to effectively tailor programs for poor, migrant, ethnic minority and other vulnerable groups, particularly along border areas. The greatest benefit for these groups is perhaps derived from health insurance, which is not directly implemented by MOH.²⁴

18. Nonetheless, MOH and provincial agencies have demonstrated that with appropriate incentives, remote villages can be reached with polio and measles vaccination and

²³ <http://vietnamnews.vn/society/274537/gender-imbalance-in-viet-nam-rises-steeply.html>.

²⁴ Ministry of Health *Joint Annual Health Review 2008 Health Financing in Viet Nam*, Viet Nam Health Partnership Group.

emergency outbreak control.²⁵ MOH has implemented the Model Healthy Village in some remote villages. The general constraints under which the health sector operates, however, does not encourage provincial and district teams to focus on migrants, ethnic minorities, and other vulnerable groups. MOH further lacks a suitable structure through which it can engage with poverty reduction and social inclusion programs outside the ministry. It is necessary to include these concerns in annual operational plans, provincial capacity and additional resources for outreach in order to address them effectively.

²⁵ USAID *Assessing Provincial Health Systems in Vietnam: Lessons from Two Provinces*. Bethesda, Md: Health Systems 20/20 Project, Abt Associates Inc. March 2015.

Appendix 3: BASIC PROVINCE HEALTH DATA

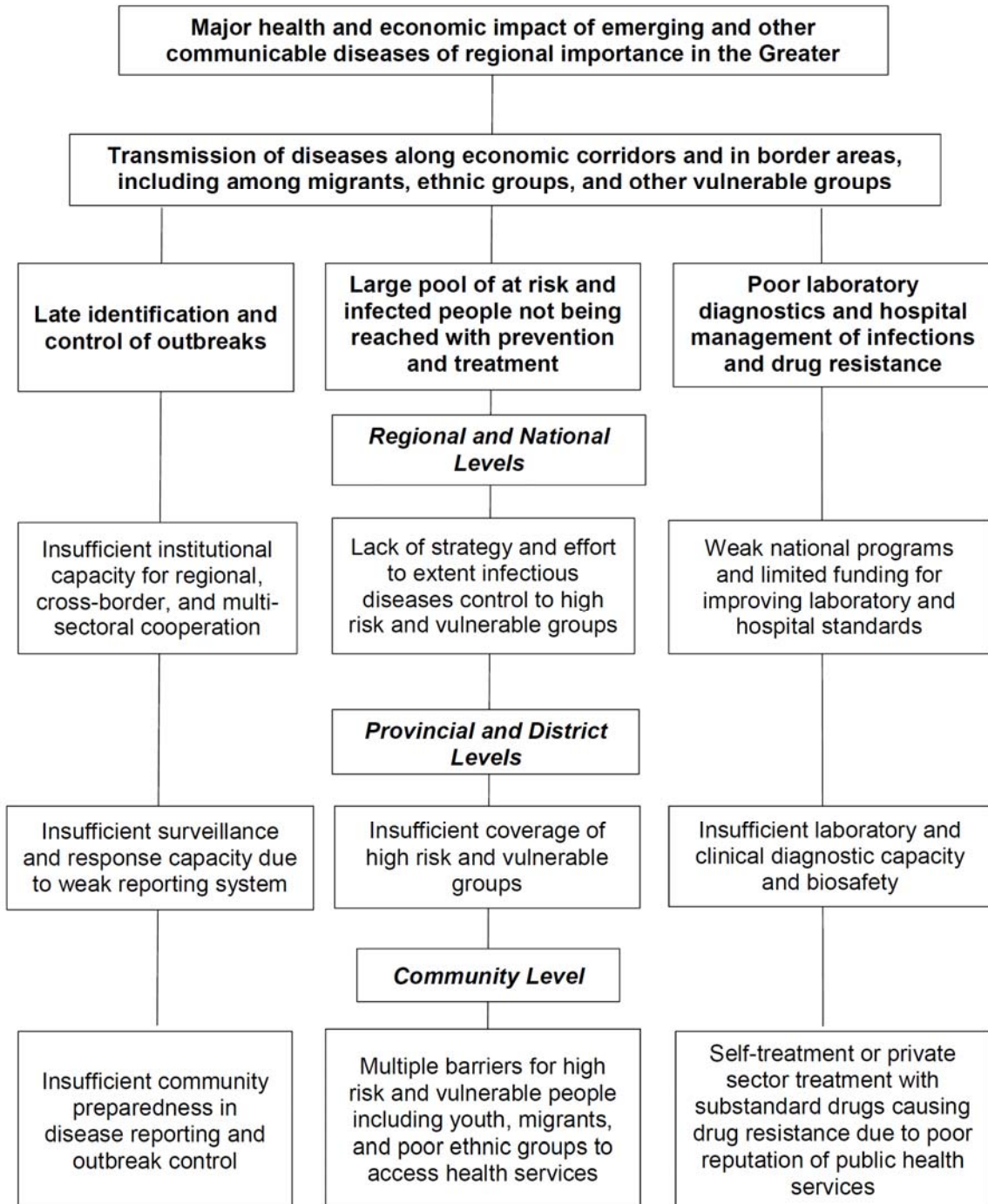
Viet Nam Basic Indicators						
	No. of poorest districts				%	
Country (64 provinces)	62				100.0	
Project (36 provinces)	59				95.2	

	Sex Ratio (Males per 100 females)	CBR (‰)	(CDR) (‰)	IMR (‰)	Prevalence of malnutrition (Underweight) (%)	HIV (Rate per 100.000 population)
Countries (Total)	97.9	16.9	7	15.4	16.2	237.4
Bac Kan	103.1	18.5	8.4	18.7	22.2	443.5
Cao Bang	98.2	17.9	9.3	25.2	20.5	403
Dien Bien	100.2	25	7.8	35.8	20.8	1002.1
Ha Giang	99.8	23.8	8.4	35.8	23.1	164
Hoa Binh	98.3	17.9	6.6	17.7	20.6	157.7
Lai Chau	104.6	23.2	7.8	44.2	23.5	446.8
Lang Son	99.9	17.8	6.7	19.5	21.1	217.6
Lao Cai	101.4	21.2	7.2	30.3	23.2	264.8
Quang Ninh	105.9	18.4	6.9	16	15.8	50.6
Son La	100.9	23.3	6.4	24.5	21.1	560.9
Bac Giang	97.8	16.8	7.2	16	17.3	130.9
Phu Tho	98.2	16.8	8	15.8	17	187.2
Yen Bai	99.7	20.4	7.8	29.6	20.8	517.9
Ha Nam	95.7	12.8	7.7	12.6	15.9	150.4
Nam Dinh	95.8	12.5	8.4	13.4	14.5	194.7
Thai Binh	93.4	11.2	9.3	11	15.1	202.5
Ninh Binh	99.4	17.9	8.6	15.1	16.8	253.6
Ha Tinh	97.5	16.3	8	18.1	19.2	60.9
Nghe An	98.5	19.3	6.5	17.4	20.2	187.8
Quang Binh	100.1	19.1	7.5	18	21	31.7
Quang Tri	98.1	17.5	7.9	33.8	17.2	40.6
Thanh Hoa	97.7	16.7	7	16.2	20.8	147.4
Binh Dinh	95.1	15.9	7.8	16	17.2	29.9
Ninh Thuan	101.6	17.5	5.9	17.4	21.4	52.9
Quang Nam	95.9	19.1	6.9	17.4	16	43.1
Quang Ngai	97.3	17	6.7	18.9	17.2	300.3
Dak Lak	101.9	18.5	6.1	24.6	24.6	24.4
Dak Nong	114.3	21.5	5.9	28.5	24.8	280.9
Gia Lai	104.3	19.4	6.2	30.8	24.3	50.5
Kon Tum	113.6	25.6	7.5	40	26.3	48.9
Lam Dong	100.1	18	6.1	16.5	14.6	92.6

	Sex Ratio (Males per 100 females)	CBR (‰)	(CDR) (‰)	IMR (‰)	Prevalence of malnutrition (Underweight) (%)	HIV (Rate per 100.000 population)
Binh Phuoc	101.9	14	6.9	14.8	17.8	174.3
Tay Ninh	97.8	16.1	7.4	12.5	15.2	200.6
An Giang	99	17.5	7.8	15.2	15.2	226
Bac Lieu	99	15.7	5.6	13.1	15	243.6
Hau Giang	101.8	14.9	6.8	19.6	15.3	136.8
Kien Giang	101.1	16.2	5.4	13.1	15.4	230.3
Vinh Long	97.2	16.3	7.1	10.9	16.2	196.7
Ha Noi	98.6	17.1	7.2	10.5	8.1	292
Vinh Phuc	97.6	18.7	7.3	13.7	16.9	95.4
Bac Ninh	96.6	22.8	7.5	13.7	12.9	159.2
Hai Duong	96.1	16.2	7.7	12.3	13.9	227.1
Hai Phong	98.6	18.8	7.6	12.7	9.6	369
Hung Yen	97.6	15.7	7.9	13	14.4	108.9
Thai Nguyen	97.2	18	7	15.3	14.4	604.9
Tuyen Quang	100.2	18.4	8	18.9	16.7	98.4
Thua Thien Hue	97.8	18.2	7.2	21	14.6	59.5
Da Nang	97.3	18.4	6.1	9.5	5.4	69.3
Khanh Hoa	98.2	16.4	6.6	14.7	13.8	152.2
Phu Yen	100.2	15.9	6	16	17.2	19.3
Binh Thuan	101.2	18.3	5.5	13.4	17.6	88
Binh Duong	93	21.5	5.6	9.4	10.6	155.5
Dong Nai	96.2	16.2	6.6	8.1	11.5	198.5
Ba Ria- VT	99.9	14.9	7.1	8.7	9.5	426.6
TP.HCM	90.4	13.2	6.3	8.1	5.3	663
Long An	98.7	16.8	7.3	10	11.5	152.9
Ben Tre	96.2	15.3	7.9	10.3	13.9	120.5
Tra Vinh	97.1	16.3	7.2	12.9	16.9	101.6
Dong Thap	99.3	12.6	6.4	12.5	15	245.7
Can Tho	98.9	13.9	6.8	9.9	13	369.2
Soc Trang	98.8	15.4	6	10.7	16.2	140.3
Bac Lieu	99	15.7	5.6	13.1	15	243.6
Ca Mau	100.9	15	5.8	12.9	15.1	157.7

Source: Health Statistics Yearbook 2012.

Appendix 4: PROBLEM TREE



Appendix 5: Results Framework

GMS Health Security Sector Outcomes		GMS Health Security Outputs		ADB GMS Health Sector Operations	
Impact/Outcomes with ADB Contribution	Indicators with Targets & Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Contributions
<p>Impact by 2025: GMS public health security enhanced</p> <p>Outcome by 2020: GMS Health Security System achieved IHR/APSED standards</p> <p>Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas accessed services for communicable diseases control (CDC)</p>	<p>Impact indicators Zero major outbreaks of emerging or other epidemic disease in excess of 100 fatalities Outbreaks have less than 0.5% impact on GDP in any quarter of the year Migrants, ethnic minorities and other vulnerable group (MEVs) in border areas receiving treatment for HIV and TB doubled</p> <p>Outcome indicators IHR/APSED compliance increases from 70% to 90% average</p> <p>Coverage of disease control interventions in MEVs increases from 60% to 80% average</p>	<p>Enhanced GMS collaboration and CDC in border areas by 2020:</p> <p>Strengthened national surveillance and response system by 2020</p> <p>Improved diagnostic and management capacity of infectious diseases by 2020:</p>	<p>GMS countries report all suspected cases of notifiable communicable within 24 hrs (from zero) Each province conducts cross border and intersectoral disease control activities MEVs reached with CDC programs doubled by 2020 By 2020, all targeted public hospitals conduct web-based reporting of notifiable diseases within 12 hrs and case investigation within 24 hrs compared to 80% in 2014 Targeted laboratories meeting national quality and biosafety standards increases from 30% to 60% Targeted hospitals meeting 60% of IPC and case management standards increased from 30% to 80%</p>	<p>Planned key activity areas: GMS Health Security Project \$125 million: Cambodia \$21.0 million ADF loan; Laos \$8 million grant and \$4 million ADF loan Myanmar \$12.0 million ADF loan Viet Nam \$80.0 million ADF loan</p> <p>ADB Projects in the pipeline with estimated amounts: tbd</p> <p>Ongoing ADB projects with approved amounts: Second GMS CDC Project \$63.5 million Strengthening HIV Prevention Capacity in the GMS Project \$20.3 million Regional Capacity Building TA for Malaria Elimination and CDC capacity building Project \$17.2 million</p>	<p>Planned key activity areas: Regional, cross-border and intersectoral collaboration for CDC among all GMS countries; including joint planning to reach MEVs; Outreach program to link MEVs with CDC program Web-based surveillance system including community syndromic reporting, and rapid outbreak response Laboratories with better biosafety and quality of diagnostic tests Hospital with better infection prevention and control and case management of infectious diseases</p> <p>Planned projects: tbd</p> <p>Ongoing projects: HIV prevention Malaria control</p>

Source: ADB.

CDC = Communicable Diseases Control; GMS = Greater Mekong Subregion; HMT = HIV/AIDS, Malaria and Tuberculosis

Project number: 48118-REG

**R-PPTA 8842: THE GREATER MEKONG
SUBREGION HEALTH SECURITY PROJECT**

2016

Table of Content

Acronyms	1
Executive Summary	2
I. Introduction	4
<i>a. Assignment</i>	4
<i>b. Project Summary</i>	4
II. Major public health problems	5
<i>a. Epidemiology</i>	5
<i>b. Demand for laboratory services</i>	6
III. Organization, Policies and Plans	6
<i>a. Organization</i>	6
<i>b. Policies and Plans</i>	7
IV. Situation Analysis	7
<i>a. Overall Assessment</i>	7
<i>b. Facilities and Biosafety</i>	8
<i>c. Laboratory services</i>	9
<i>d. Quality improvement</i>	10
V. Proposal	11
<i>a. Overall priorities</i>	11
<i>b. Facilities and biosafety</i>	11
<i>c. Laboratory services</i>	11
<i>d. Quality improvement</i>	12
<i>e. Support services</i>	13
VI. Implementation and Monitoring	13
<i>a. Implementation</i>	13
<i>b. Monitoring</i>	14
VII. Conclusion	15
Appendix 1: Laboratory Summary Matrix	16

Acronyms

ADB	—	Asian Development Bank
AIDS	—	acquired immunodeficiency syndrome
APSED	—	Asia Pacific Strategy for Emerging Diseases
BSL	—	biosafety level
CDC	—	communicable diseases control
CDCD	—	Communicable Disease Control Department
CLIS	—	Cambodian Laboratory Information System
CLMV	—	Cambodia, Lao PDR, Myanmar, Viet Nam
CPA	—	complementary package of activities
DPHIS	—	Department of Planning and Health Information Systems
EA	—	Executing Agency
EID	—	emerging infectious diseases
GDP	—	gross domestic product
GMS	—	Greater Mekong Subregion
HIV	—	human immunodeficiency virus
IHR	—	International Health Regulations
MEV	—	migrants and mobile people, ethnic minorities, and other vulnerable groups
MOH	—	Ministry of Health
NIPH	—	National Institute of Public Health
PMU	—	Project Management Unit
SLMTA	—	Strengthening Lab Management Through Accreditation
TB	—	tuberculosis
WHO	—	World Health Organization

Executive Summary

This report summarizes the assessment of laboratory services for the Greater Mekong Subregion (GMS) Health Security Project (the Project) of Cambodia, Lao PDR, Myanmar, and Viet Nam. It was prepared by the international laboratory quality improvement specialist and team members as part of the project preparation of the Asian Development Bank (ADB).

The Project will focus on regional cooperation and disease control in border areas, strengthening disease surveillance and outbreak response, and improving laboratory services and infection control in hospitals. The Ministry of Health will be the executing agency, and will establish a project management unit (PMU). The Department of Planning and Health Information Systems, the Communicable Diseases Control Department, the Department of Hospital Services and the National Institute of Public Health and 13 provincial health office will implement the Project in 13 targeted provinces, including for improving laboratory services. Total project costs in Cambodia for 2017 to 2012 are estimated at \$22.8 million.

Cambodia, with a population of 15.6 million in 2015, has gained from rapid increase in connectivity and industrialization. It has seen major migration and rapid urbanization. The country had several outbreaks of emerging infectious diseases, and has a large burden of tuberculosis and dengue, a residual malaria problem, and a concentrated HIV epidemic. Common communicable diseases remain the major burden among children and the poor. Drug resistance is an emerging public health problem. All these constitute major public health and economic risks.

Despite a basic network of health services, a large share of the population, including migrants, the poor, and isolated ethnic groups, do not access formal health services. Hence there are gaps in diagnostics for surveillance, prevention, control, and management of infectious diseases, in particular in border areas and industrial zones, which makes it hard to manage health services.

Cambodia is committed to implement the international health regulations (IHR) and the Asia Pacific Strategy for Emerging Diseases (APSED), and implement regional strategies for the control of emerging infectious diseases (EIDs) and other major diseases such as dengue, malaria, tuberculosis and HIV/AIDS. Despite major political commitments and support from partners including the Asian Development Bank, access and quality of services are still insufficient.

One priority area is improving diagnostic capacity for evidence-based decision making. For MOH to have confidence in communicable disease data and to be able to plan and evaluate responses to outbreaks, it requires a reliable diagnostic laboratory system staffed by appropriately trained staff working in facilities that are safe for staff and which pose no threat to the community. During this TA, discussions with stakeholders, field visits and document review identified gaps in laboratory services, and priorities for investment under this Project.

Based on the WHO regional plan for strengthening laboratory services, MOH has developed a national laboratory plan which is however rolled out in a fragmented manner and with serious resource constraints. Several partners are assisting MOH in improving biosafety and quality improvement. However, laboratory services are not up to standard in all except the larger provincial laboratories, and, except for HIV, malaria and tuberculosis, nation-wide systems to improve quality of laboratory services are yet to be put in place.

To assist Cambodia meet its obligations under IHR/APSED and a number of other treaties and agreements, the project will provide key items of equipment to enable the next batch of provincial laboratories to diagnose communicable diseases of regional and international significance and train staff to undertake these responsibilities accurately and safely. Training provided will be generic and applicable to a wide range of communicable diseases. The project also will assist staff in MOH laboratories to develop both internal and external Quality processes that will ensure MOH obtains reliable data in a timely manner.

I. Introduction

a. Assignment

1. To identify priorities and progress and address gaps in laboratory services to maximize project benefits, a laboratory services review was carried in 4 countries by one international consultant and team members. This included (i) a general subsector review to identify priorities, and (ii) a specific assessment of equipment and other investment needs in targeted states/region to identify specific investment needs, and (iii) identification of implementation and monitoring arrangements, risks, and mitigation. This report identifies laboratory services challenges and plans, a summary of progress and issues in various laboratory functions, and project laboratory investment, implementation and risk mitigation proposals. The sector summary matrix is attached to the CLMV laboratory reports. Equipment details are in the procurement plans.

b. Project Summary

2. Under the GMS economic development program, ADB has been supporting various health projects for communicable diseases control (CDC), HIV, Malaria, and related regional technical assistance.¹ The Governments of Viet Nam, Cambodia, Lao PDR, and Myanmar and ADB have prepared the Project to strengthen national health security systems and regional cooperation for the prevention and control of EIDs and other diseases of regional importance in the GMS, and help countries to comply with IHR 2005 and implement APSED of the WHO.²

3. The proposed project goal is strengthened GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities, (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year, and (iii) increased use of public health services in border areas by MEVs. The proposed project outcomes are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed project outputs are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed project targets 13 provinces in Cambodia along the borders and economic corridors with Lao, Thailand and Viet Nam.

4. MOH has made progress with regional information sharing and cross-border cooperation for CDC. However, this needs to be mainstreamed and formalized. In addition, some groups of MEVs that are more likely to get and spread infectious diseases are not using regular health services. Under the first output, the Project (i) supports regional, cross-border, and inter-sectoral information sharing and coordination of outbreak control among GMS countries, (ii) develops regional disease control strategies and evidence-based CDC, and (iii) improves CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for joint planning and monitoring; and outreach and community mobilization to reach and engage MEVs.

5. MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis is strong. However, the system needs to be further computerized and extended to communities by employing syndromic reporting. Linkages or

¹ Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

² World Health Organization. Asia Pacific Strategy for Emerging Diseases. 2010.

integration among surveillance systems will also be improved. MOH also needs to improve capacity for disease outbreak response. Under the second output, the Project supports (i) syndromic reporting at community level, (ii) web-based reporting including information technology support, (iii) integration of surveillance systems, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport, and (vi) improving screening and quarantine capacity at border posts of entry and international quarantine centers. Support is needed for system design, computers, training, and vehicles and equipment for outbreak control.

6. District facilities are unable to comply with internationally acceptable levels of biosafety or to guarantee the accuracy of their laboratory testing.. Underlying problems are substandard training of laboratory staff, lack of quality control, and insufficient facilities, equipment, and supplies. The quality assurance system is in a nascent stage, and there is no national laboratory audit system. Nosocomial or hospital-acquired infections are becoming a major public health problem. Under the third output, the Project supports (i) improving quality assurance, (iii) in-service training, (iv) improving district laboratory services, and (iv) equipment and training for infection control and case management of dangerous diseases.

7. In Cambodia, the Project is estimated to cost \$22.8 million including \$21 million in loan from ADB; and will be implemented by MOH through the Department of Planning and Health Information Systems representing the EA, and CDCD, NIPH and 13 provinces in the north-west, north-east, and south-east. The Project will be implemented over a period of 5-year period beginning early 2017. The project completion date is 30 June 2022.

II. Major public health problems

a. Epidemiology

8. Globally, all countries are at risk of outbreaks of emerging infectious diseases (EIDs). The International Health Regulations (IHR), 2005, of the World Health Organization (WHO) mandates all countries to improve health security against EIDs. The Asia Pacific Strategy for Emerging Disease (APSED), 2010, of the WHO regional offices identifies 10 strategic areas for compliance by not later than 2016. At present, compliance has reached about 70-80% in the region, with specific gaps mainly relating to laboratory services, hospital infection control, and cooperation for outbreak prevention and control with communities, other sectors, and countries.

9. Cambodia, located in South-east Asia and close to major population hubs with biosafety problems, has been identified as being a potential site for likely outbreaks of emerging infectious diseases (EID) such as SARS, Highly Pathogenic Influenza, or Ebola Hemorrhagic Fever. with pandemic potential that may result in major mortality and economic meltdown. Cambodia is particular vulnerable because its health system is still weak.³ It has developed extensive infrastructure in the past 40 years, but poor access, limited rural staff capacity, and financial constraints affect sector performance. Hence, in addition to making efforts to strengthen provincial and district capacities, the Government is making major efforts to reach out to villages and improve village capacity to address health problems, including prevention and control of infectious diseases.

³ WHO Cambodia. 2014. *Country Cooperation Strategy*. Cambodia has the highest number of cases of AI H5N1, 47 cases during 2005-2013.

10. While the burden of communicable diseases have declined overall in Cambodia, it remains high, and there are new risks for the spread of communicable diseases because of (i) improved connectivity, (ii) urbanization, industrialization with associated slum formation and labor camps, (iii) increased drug resistance, particularly for hospital infections, TB, malaria and HIV, (iv) reduced compliance with preventive measures like vaccination, and (v) emerging and re-emerging diseases for which control measures are still being developed. The incidence of dengue has steadily increased, mostly in children. Outbreaks of diarrheal diseases and other highly infectious conditions are also a major burden. Immunizable diseases remain common due to low immunization coverage among poor rural children.

11. There is an assumption that pediatric vaccine cover provides complete protection against these priority diseases in vaccinees. This assumes that the vaccine delivered was viable e.g. the cold chain was effective, and ignores the requirement of levels of herd immunity in excess of 80 per cent to prevent transmission of diseases like measles. This project should include surveillance for vaccine preventable diseases.

b. Demand for laboratory services

12. There are two principal sources of demand for laboratory services. The first is for information which will inform treatment of the patient and the second is for information which is of public health significance and should drive outbreak responses and Government policy. Eighty to ninety per cent of health costs in Cambodia are borne by the patient so the demand for laboratory services is driven, principally, by economic factors i.e. the ability of a patient to pay for the testing. External funding, principally from the Global Fund, ensures a reasonably comprehensive laboratory diagnostic service for HIV, TB and malaria. Almost all other laboratory testing is dependent on the ability of the patient to pay or ad hoc support by external funding agencies.⁴

13. The current situation does not reflect what the demand for laboratory services should be. A case could be made for the provision of free laboratory testing for diseases (in addition to HIV, TB and malaria) that are of major public health significance e.g. dengue, leptospirosis, vaccine preventable diseases, antimicrobial resistance etc. It is not necessary to provide comprehensive laboratory testing for these diseases in order to be able to identify significant problems with emerging antimicrobial resistance, systematic failures in the pediatric immunization program, to respond to outbreaks and to evaluate the effectiveness of responses. For example, the 2016-2020 WHO Regional Dengue Control Plan is considering recommending systematic testing of only 10% of suspected dengue cases.

III. Organization, Policies and Plans

a. Organization

14. The Deputy Director of the Hospital Services Department within MOH is responsible for Medical Laboratory Services. The National Policy for Medical Laboratory Services and a National Strategic Plan for Laboratory Services reference to the National Guidelines on Complementary Package of Activities for Referral Hospital Development from 2006 to 2010 and

⁴ US Center for Disease Control and Prevention, World Health Organization Cambodia. 2013. *Assessment of the National Laboratory System and Facilities in Cambodia*.

stipulate the capacities for laboratories at CPA1 (most advanced) through to CPA3 (least developed) hospitals.⁵

b. Policies and Plans

15. Cambodia is a signatory to both the International Health Regulations (IHR) and to the Asia Pacific Strategy for Emerging Diseases (APSED) although it is not compliant with either. It also has a number of key strategies in place, related to this project, making the task ahead much easier than in some neighboring countries. There was a Ministry of Health Strategic Plan for 2008-2015 and presumably there is/will be one for 2016 onwards. The 2008-2015 plan addressed the issue of communicable disease surveillance and control in broad, unsurprising, terms. The MOH Strategic Plan communicable disease control priorities were reproductive tract infections (HIV/AIDS/STI), TB, leprosy, dengue fever, malaria, Helminthiasis, Schistosomiasis, Emerging and reemerging diseases and International Health Regulation implementation.

16. Cambodia also has a National Policy for Medical Laboratory Services and a National Strategic Plan for Laboratory Services 2010-2015. Quite an amount of this material is aspirational rather than reflecting current practice and capabilities.

17. Cambodia has developed national biosafety guidelines based broadly on the WHO Guidelines. These will be given legal authority when they become Regulations, probably in early 2017.

IV. Situation Analysis

a. Overall Assessment

18. Laboratory facilities and staff vary widely across Cambodia depending, principally, on the amount and type of support they are receiving from external sources. A number of laboratories in the previous ADB CDC project were barely fit for purpose and require/required significant renovation. Efforts are being made to improve the safety of laboratories but this still a work in progress. While there are Quality Assurance processes in place for HIV, TB and malaria testing, it is not clear how systematic this is or what corrective actions are taken when issues are identified. **There are no other, systematic, national Laboratory Quality Assurance programs.**

19. There are a number of external players providing advice and support for communicable disease surveillance and control in Cambodia. The W.H.O. Country office was holding monthly meetings to provide a forum to allow donors to hear what others were doing or planning to do. MOH should be supported to co-ordinate these activities in order to minimize the enormous variety, and quality, of equipment, reagents and training being provided for communicable disease surveillance and control.

20. A number of MOH laboratories, including several covered by this project, were reviewed by Integrated Quality Laboratory Services with support from the U.S. Centers for Disease Control between July and November 2013. Three documents were produced – “Assessment of the National Laboratory System in Cambodia”, Summary Report” and “Gap Analysis”. It is not

⁵ MOH. 2015. *National Laboratory Strategy 2015-2020*.

clear what steps MOH has been able to take to implement any of the recommendations in this report.

21. The most recent Cambodia MOH Annual Performance Monitoring Report identifies dengue and helminths as two priority areas for CDC and complements the TOR for this project. However, the “constraints” and “next steps” listed for dengue in this report warrant detailed scrutiny, in particular also because the Asian Development Bank was a lead donor for Dengue control (see below).

“Constraints”

- Funds not enough to cope with the overall real dengue situation
- Inadequate equipment and supplies for surveillance system (computers, phone, fax machines) and clinical management monitoring, especially at intensive care units of 63 Provincial Referral Hospitals (CBC machines, vital signs monitoring machines, centrifuge machines, blood cuffs etc., and at Health Centers
- Not enough reagents for labs and no rapid diagnosis tests to support investigation activities, during dengue epidemics
- Not enough resource persons for data collection and management
- Health education coverage still low for community and schools (TV/radio broad casting not on time, IEC materials production not sufficient)
- Less supervision/follow-up activities for health education (school and community based) surveillance system and clinical management
- Application of Integrated Vector Management as rapid response activities in some localities of some dengue outbreak provinces not properly done and not on time
- In some localities, little or no participation of local authority/parents.”

“Next steps”

- Advocate for adequate funding to cover all dengue strategy/ activities
- Procure equipment and supplies for surveillance system and for clinical management monitoring
- Procure reagents for lab and rapid diagnosis tests
- Conduct training of resource persons for data collection and management
- Expand health education coverage for all high risk communities, and schools (TV/radio broadcasting needs to be on time and cover the transmission period, IEC materials production needs to be sufficient)
- Strengthen supervision/follow-up activities for health education (school and community-based), surveillance system and clinical management
- Advocate for allocation of some budget as a package for rapid response activities as IVM strategy”

b. Facilities and Biosafety

22. A number of laboratories in the previous ADB CDC project were barely fit for purpose and require/required significant renovation. There was neither the time nor resources to review all laboratories to be covered by this project. The second batch of provincial laboratories to be upgraded (Banteay, Meanchey, Kratie, Kampot, and Stung Treng) also require urgent refurbishment to make them safe. All project laboratories should be assessed in Year 1 by the national and international Laboratory Consultants, before any equipment is purchased, to determine needs (other agencies may have provided key equipment recently) and the capacity to accommodate any proposed equipment purchases.

23. Significant amounts of equipment were purchased by ADB towards the end of the previous CDC project. The utilization and maintenance of this equipment should be assessed before plans and specifications are developed for further purchases.

24. National staff will require significant assistance in the preparation of specifications for equipment and reagents in order to ensure value for money. A business case needs to be made for each item of equipment costing >US\$10,000. Spending \$100,000 on a piece of equipment to perform 20 tests per year is unlikely to represent value for money. Wherever possible, procurement should include delivery, calibration and a budget for routine maintenance/re-calibration for, perhaps, 5 years. **This is critical for biohazard safety cabinets.**

25. Specifications for diagnostic kits/reagents must include a requirement for data for sensitivity and specificity for the item and this must be the first priority in identifying a successful tenderer. The practice of lumping large numbers of diverse items in a bulk tender almost invariably results in poor value for money. Local staff will require assistance in preparing specifications and in grouping items for tendering if this process is to be employed. This assistance must be provided by someone conversant with the use of laboratory equipment/supplies and the International Laboratory Consultant might be the most appropriate person.

26. Cambodia has translated the W.H.O. Biosafety Guidelines into Khmer and distributed them to all laboratories. This is an important first step towards identifying activities needed to make all laboratories safe. It also is essential for the development of Standard Operating Procedures covering laboratory activities. However, some agencies believe the Guidelines may be too complex for widespread adoption.

27. Adoption of Biosafety Guidelines will address some of the concerns about waste management because they describe how all waste should be managed/treated prior to discard. The broader issue of whether treated waste is to be buried or burned and where this is to occur should be addressed at a national level and will involve other Government agencies in addition to MOH.

28. The practice of taking lab coats/garments home for washing poses an enormous risk to the community in the event of a SARS, MersCoV or even Ebola outbreak. All laboratories should have the capacity to launder these garments on-site. For most facilities, a domestic washing machine would be adequate.

c. Laboratory services

29. With the possible exception of HIV, TB and malaria, Cambodia MOH cannot guarantee the accuracy of any testing for communicable diseases in its laboratories.

30. Significant amounts of equipment were purchased by ADB towards the end of the previous CDC project. The utilization and maintenance of this equipment should be assessed before plans and specifications are developed for further purchases. The need for, and ability to accommodate and use, additional equipment and equipment for new project sites should be assessed by the International and National Laboratory Consultants prior to any purchases being made. There should be a clear link between the equipment being purchased and the aims of this project.

31. There can be a tendency to purchase large items of equipment without provision of the reagents they require or an assessment of the demand for their use.

32. Two drivers for the purchase of new equipment should be quality and safety – every Scientist should be using a clean, calibrated, micropipette and tips that have not been recycled. They should be using tests/reagents that are in date and able to provide results of the highest sensitivity and specificity. They should be wearing a lab gown, closed toe shoes and have access to gloves and safety glasses. If they are performing procedures that could generate infectious aerosols, they should have access to a class II Biohazard Cabinet. There should be a functional autoclave for the sterilization of all biological waste.

33. The variety and size of some equipment in diagnostic laboratories makes centralized repair and maintenance unrealistic. The Quality processes proposed will identify failures in equipment calibration and most of these failures could be addressed by the operator, on site, if they are trained properly when equipment is purchased. Any purchase of class II biohazard cabinets must be accompanied by a budget for annual calibration by an approved tester. As the number of such cabinets in Cambodia increases, MOH should consider having a small team trained and equipped to undertake this calibration on all hoods annually. Vietnam MOH has done this.

d. Quality improvement

34. The previous ADB CDC project began to address the issue of documentation in laboratories, particularly Standard Operating Procedures and this should be continued. Twelve MOH laboratories are using the WHO Laboratory Quality Stepwise Implementation process and another 15 are using the US Strengthening Lab Management Through Accreditation (SLMTA) process. There is a US\$50,000 fund organized by WHO to support Quality processes in Cambodia. The New Zealand Pacific Paramedical Training Centre is delivering a number of Quality programs but the focus is principally on hematology and biochemistry rather than assays to diagnose communicable diseases. The program involves 31 laboratories.

35. Efforts are being made to integrate the Patient Management and Registration System and the Cambodian Laboratory Information System (CLIS). Microsoft Access was used initially but it didn't work. CLIS was recoded and is being evaluated in pilot phase. Both these are web based.

36. Many Doctors at the Provincial and District levels have never heard of diseases like Leptospirosis, Brucellosis, many of the Neglected Tropical Diseases or many of the agents responsible for diarrheal diseases (i.e. food borne diseases). They also lack the training to interpret the results of serological tests. There is an almost impenetrable divide between many Doctors and laboratory staff that hampers appropriate laboratory testing and reliable interpretation of data. All future CDC Laboratory Workshops should include equal numbers of Laboratory Staff and Doctors in an effort to address these deficits.

37. The lack of prioritization in the training of undergraduate Medical Laboratory Scientists means that almost all training, even in critical areas of diagnostic activity, is under-resourced. This results in staff entering the workforce poorly prepared for the job ahead of them. The impact and effectiveness of in-service training in the workplace is not evaluated in any systematic manner. MOH Cambodia recognizes these weaknesses and the issues were

addressed in the MOH 2008-2015 Strategic Plan – “Increase competency and skills of health workforce to deal with increased demand for accountability and high quality care, including through strengthening allied technical skills and advanced technology through increased quality practice of training, career development, right incentives, and good working environment”.

38. There would be value in the National Laboratory Consultant being a mid-career Scientist from within the Cambodian laboratory system – several individuals might fill this role during the course of the project as a means of building residual capacity within the Cambodian diagnostic laboratory system.

V. Proposal

a. Overall priorities

39. This project should support MOH diagnostic laboratories at project sites to diagnose selected diseases accurately and safely and deliver this data to the central Epidemiology office in a timely manner. It also should support the development of a referral system for the safe and timely delivery of problematic samples to the National Institute of Public Health or other referral centers.

b. Facilities and biosafety

40. The project should support the roll out of national biosafety guidelines – as hard copy in the first instance. The project should support the implementation of these guidelines with on-site training based on an audit of the facility by the National and International Consultants and the local staff against the national guidelines.

41. Facilities must be fit for purpose i.e. they must be weather proof, insect proof and have doors and windows that can be closed. Laboratories requiring cooling must have air conditioners rather than ceiling fans that create dangerous aerosols. Laboratory benches must be impervious to liquids so they can be disinfected. If procedures are likely to generate infectious aerosols, they must be performed in a class II Biohazard cabinet. There must be a hand basin near the exit for staff to wash hands. There must be access to a functional autoclave and there must be a formal plan for disposal of waste.

42. All laboratory staff should have access to personal protective equipment (closed shoes, laboratory gowns, disposable gloves, safety glasses) and the capacity to launder the gowns on-site.

c. Laboratory services

43. Project laboratories should be supported to diagnose a limited number of significant communicable diseases in their catchment area. The support will be a mix of equipment, reagents/test kits and training. For larger, central, laboratories where there is a significant volume of samples, anti-microbial resistance should be included in the mix of tests supported. At smaller laboratories, where the investment in bacteriological equipment cannot be justified because of the small number of samples, the focus might be on diseases like dengue and leptospirosis which can be diagnosed with point of care tests. One or two other tests, of local importance, could be added to this list.

44. It will not be possible to provide comprehensive testing so a system of selective testing should be developed. The recommended model is to test, each month, a number of patients equivalent to 10% of the historical average of patients reported with that disease i.e. if the average number of dengue patients at that locality in September is 150, then 15 patients should be tested each September of the project. The project should provide the materials required to do this testing.

45. Many Doctors at the Provincial and District levels have never heard of diseases like Leptospirosis, Brucellosis, many of the Neglected Tropical Diseases or many of the agents responsible for diarrheal diseases (i.e. food borne diseases). They also lack the training to collect samples at the correct time and to interpret the results of serological tests. There is an almost impenetrable divide between many Doctors and laboratory staff that hampers appropriate laboratory testing and reliable interpretation of data. Future training Workshops should include both Doctors and Laboratory Scientists and they should continue to be competency based.

46. The lack of prioritization in the training of undergraduate Medical Laboratory Scientists means that almost all training, even in critical areas of diagnostic activity, is under-resourced. This results in staff entering the workforce poorly prepared for the job ahead of them. The impact and effectiveness of in-service training in the workplace is not evaluated in any systematic manner. MOH Cambodia recognizes these weaknesses and the issues were addressed in the MOH 2008-2015 Strategic Plan – “Increase competency and skills of health workforce to deal with increased demand for accountability and high quality care, including through strengthening allied technical skills and advanced technology through increased quality practice of training, career development, right incentives, and good working environment”. The project should purchase, key, minor items of equipment that will be used to train undergraduates to diagnose communicable diseases related to this project. Priorities might be micropipettes and their disposable tips; a top loading balance to aid the calibration of the pipettes; 100 point of care tests to detect pregnancy and 100 to diagnose dengue.

d. Quality improvement

47. A priority for this project should be to continue and extend the process of preparing Standard Operating Procedures (SOPs) for all testing and processes covered by this project. The previous ADB CDC project began to address this issue and it should be continued. Production of SOPs is a critical first step in the national laboratory Quality improvement process. W.H.O. Cambodia also is a strong proponent of the (US) President's Emergency Plan for AIDS Relief (PEPFAR) quality processes and the Laboratory Consultants should consult with all players in this space in Cambodia to minimize overlap and duplication.

48. The National Institute of Public Health (NIPH) should be introduced to the System for Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) and other project laboratories encouraged to engage with its processes.

49. A priority for this project should be to support the National Institute of Public Health to confirm that it can undertake laboratory testing at an internationally acceptable standard, to harmonize existing Quality programs and roll out external assurance programs nationally one test at a time.

50. Dengue point of care testing might be a suitable point to start. This could be approached in two ways (1) NIPH prepares a panel of 3-4 sera which it sends as coded samples to project labs for testing or (2) project laboratories send 2-3 positive and 2-3 negative samples to NIPH for confirmatory testing. As preparing panels of sera from patients can be a challenge, option (2) is recommended. NIPH should be assisted to develop a process of corrective actions for those laboratories that are unable to obtain correct results.

51. There is a need to review the existing Quality Assurance Programs for TB, HIV and malaria to ensure they are ensuring quality diagnoses and that necessary corrective actions are being taken.

e. Support services

52. Two key issues are management of laboratory services, an recurrent funds for supplies. In any assessment of laboratory services, these should also be included. As noted, laboratory services supported by mentoring provided by NGOs show much better performance. The question is how this process can be provided by NIPH in a sustained manner, e.g., by temporary posting of NIPH staff to provincial hospitals, telemedicine, and other arrangements for inspection and support. The Project may examine this topic further and make recommendations for network capacity building.

VI. Implementation and Monitoring

a. Implementation

53. It is critical that the National and International Consultants establish contacts with WHO and other participants in the Laboratory sector in Cambodia as soon as the project commences. There are a number of players in the communicable disease/diagnostic laboratory space resulting in overlapping and confusing messages for Cambodian counterparts in the areas of Quality and Safety. Similarly, equipment maintenance and calibration can be simplified and coordinated within MOH and across projects if there is commonality between key items of equipment.

54. MOH should consider allowing the National Laboratory Consultant to be drawn from the ranks of mid-career scientists in its laboratories e.g. from the National Institute of Public Health. This would have the advantage of retaining the skills gained working with an International Consultant within MOH at the conclusion of the project. The appointment could be for 1-2 years and MOH would need to guarantee they could return to their original appointment, without loss of seniority, at the end of their contract.

55. There has not been the opportunity in the planning phase of this project to inspect each of the participating laboratories. Experience with previous ADB CDC projects suggests that third party inspections/audits of laboratories prior to commencement of the project have been unreliable and misleading and has resulted in the purchase of unwanted equipment or even equipment that did not fit in the laboratory. At the commencement of the project, the National and International Consultants should visit each laboratory to identify any critical renovations that might be necessary to ensure safety, to confirm that all intended equipment is required, to assess existing Quality processes and staff competencies and to identify any other unforeseen

obstacles. This is not a complex process and each laboratory visit could be completed in 3-4 hours.

56. The specifications for equipment and reagents should be prepared by the Procurement Specialist in consultation with the Laboratory Consultants and in the light of the laboratory inspections. Personal protection equipment should receive priority for procurement. Shoes can be purchased locally and laboratory gowns have been made locally in previous ADB CDC projects. Specifications for all diagnostic kits/tests should include criteria for sensitivity and specificity.

57. The number of diagnostic kits/reagents supplied to each laboratory must reflect the need and the ability of staff to perform the testing or to be able to be trained to do the testing. Criteria might include whether ALL suspected patients need to be tested or whether a sub-sample is sufficient. The "10%" proposal above might be considered and formal criteria prepared.

58. The specifications for class II biohazard cabinets must include on-site testing after delivery and installation to guarantee the integrity of the HEPA filters.

59. Training of staff should begin as soon as possible, address National and International policy and focus on core skills in support of Quality and Safety. Key elements of the training might be – internationally accepted case definitions for communicable diseases covered by this project, criteria for the diagnosis of a communicable disease, how to use and maintain a micropipette, preparation of Standard Operating Procedures, proper use of PPE, safe use of an autoclave, All training should have a significant bench based component (i.e. more than 50%), be assessed and include a component of competency based assessment. Workshops participants should include Doctors and Scientists until at least one Doctor from each site has completed training.

60. NIPH should be funded to participate in international communicable disease External Quality Assurance Programs for diseases relevant to this project, other than for TB, HIV and malaria.

61. NIPH should commence a quality Assurance Program in year 2 for one of the diagnostic tests being performed by all laboratories in the project. The simplest option would be for all laboratories to send three positive and three negative samples to NIPH for retesting on one occasion each year.

b. Monitoring

62. The National and International Consultants should visit each laboratory at least once each year to assess safety and quality processes against a pre-agreed check list. It is highly desirable that someone from NIPH participates in these visits and that this experience be used as preparation for a National Laboratory audit system. These annual visits should include an assessment of the effectiveness of the training of laboratory staff by the project e.g. have they prepared any SOPs; are pipettes and all other equipment clean and calibrated; are they using appropriate PPE; is there a clear trail from requests for testing to the recording and reporting of results; have all test results been reported to NIPH/MOH; and how did the lab perform in the EQA organized by NIPH.

63. These annual visits also will identify any problems with the supply of equipment and reagents and enable remedial action to be initiated.

VII. Conclusion

64. For Ministries of Health to have confidence in their communicable disease data and to be able to plan and evaluate responses to outbreaks, they require a reliable diagnostic laboratory system staffed by appropriately trained staff working in facilities that are safe for staff and which pose no threat to the community.

65. This project aims to support this endeavor and to assist Cambodia meet its obligations under the International Health Regulations, the Asia Pacific Strategy for Emerging Diseases and a number of other treaties and agreements.

66. The project will provide key items of equipment to enable laboratories to diagnose communicable diseases of regional and international significance and train staff to undertake these responsibilities accurately and safely. While the project will focus on a limited number of diseases, training provided will be generic and applicable to a wide range of communicable diseases. The project also will assist staff in MOH laboratories to develop both internal and external Quality processes that will ensure MOH obtains reliable data in a timely manner.

Appendix 1: Laboratory Summary Matrix

GMS Health Security: Laboratory Summary Assessment

A. GMS LABORATORY SERVICES SUMMARY				
Laboratory Services	Cambodia	Lao PDR	Myanmar	Viet Nam
1. National and Subnational Laboratories and Referral Abroad				
<i>Name of national laboratories</i>	National Institute of Public Health NIPH	National Centre for Laboratories and Epidemiology NCLE	National Health Laboratory NHL	National Institute of Hygiene and Epidemiology NIHE
<i>CDC/EID Function/Services</i>	Diagnostic tests up to BSL2+, quality control	BLS2+. Biological blood analysis, PCR (Elisa, vibro, cury-bacterian, Ecoli.) culture. Serology, Molecular, cell culture for influenza.	BSL2+, training, some research, quality control. Expanding range of pathology tests to improve surveillance	Diagnostic tests up to BSL3, vaccine production, training, research, quality control
<i>Key Issues</i>	Capacity for antibiotic sensitivity testing (AST)	Lacking of GoL budget support for reagent and supply	Major staff constraints, outdated facility and equipment	Lack of laboratory space
<i>Names of specialized CDC/EID hospitals with lab</i>	All major tertiary hospitals in Phnom Penh, Calmette hospital, Pasteur	5 centrals hospital: Mahosot, Friendship, Setha, 103, 5Mesa, MCH and Pediatric	National Hospital Yangon Regional Hospital Nay Pyi Taw, Regional Hospital Mandalay Department of Medical Research	Bach Mai Infectious Diseases Hospital, Hanoi, all major tertiary hospitals in Hanoi and HCMC
<i>CDC/EID Function/Services</i>	Disease control and patient care	Serology, biological blood analysis, PCR and UTI	Care of infectious patients, diagnoses	EIDs and other infectious diseases
<i>Key Issues</i>		Standard serology and biological no culture	Overlapping CDC roles, overlapping surveillance systems, low immunization quality needs surveillance	
<i>Names of other public CDC labs/research institutions</i>	NCHADS, NCTB, NCPERC	CHASS, NCTBC, CNMEP	NPT/Mandalay laboratories NHAP, NTP, NMP	VAAC, NTBI, NIMPE, NIHE,
<i>CDC/EID Function/Services</i>	Linked to specific technical needs of the National Programs	CPME – malaria, parasite intestinal and PCR	For TB/HIV/malaria programs	For TB/HIV/malaria programs

	including Dengue, TB, malaria, HIV/AIDS programs	TB – sputum and blood FDD – food borne disease and chemical product Dermatology Center		
<i>Key Issues</i>	Coordination	Specialist lab for each purpose. costly than hospital	Roles need to be more clearly defined, reporting	Coordination and reporting
<i>Names of other institutes involved in EID/CDC</i>		Military lab for malaria at Phontong	Military (Tattmadaw)	Military
<i>Key Issues</i>			No coordination/reporting	
<i>Names of major research labs</i>	Institute Pasteur in Cambodia	Institute Pasteur Mérieux	Institute Pasteur is linked to NHL	NIHE, IP Nha Trang IP HCMC
<i>Function/Services</i>	Biomedical research and surveillance of infectious diseases, platform for comprehensive medical and biological analyses unique in Cambodia, international vaccination center	Completed serology test and research study		Biomedical research and surveillance of infectious diseases
<i>Key CDC/EID Issues</i>		Research purpose major		
<i>Global/Regional referral labs for the country</i>	France, USA, Japan, Australia	France, Denmark, England, New Zealand, Greece, USA, Japan	UK, France, Japan, Korea, USA	USA, France, Japan, Australia
<i>Function/Services</i>		IQA/ EQA		
2. Regional Laboratories				
<i>Names</i>		Luangphabang, Military 107, ODX, SVK and CPS	NPT, Mandalay	Pasteur Institutes in HCMC, Nha Trang, Central Highlands
<i>Function/Services</i>		biology and serology, some culture in for research study only	Referral laboratories	Infectious diseases control
<i>Key CDC/EID Issues</i>			Role in outbreak	

			response not clear vis-à-vis NHL	
3. Provincial/State laboratories				
<i>Number</i>	25	17 provincial hospital lab	15	64
<i>Function/Services</i>	CPA guidelines: “provision of high quality service in medical analysis responsive to the need for diagnosis which are all necessarily pertinent to general medical and surgery services in a referral hospital”	biology and serology	Referral laboratories – general diagnostics including histology and microbiology.	General hospital laboratories for patient diagnostics Provincial medicine laboratories for infectious diseases control, food safety and screening for NCDs
<i>Key CDC/EID Issues</i>	Different capacities	Some provinces have army laboratory	New an appropriate equipment provided to state laboratories, however there is lack of capable staff and 2 state laboratories do not have a pathologist. Not clear who is responsible for laboratory services for outbreak response	High workload of provincial laboratories
4. District laboratories				
<i>Number</i>	92 referral hospitals with laboratory services based on the levels of CPA (1-3) with 1 is the lowest.	148 district laboratories	48 district hospitals	All district hospitals in 64 provinces
<i>Function/Services</i>	Id. To provincial lab	Biological and serological analysis	Hematology, parasitology, biochemistry, urine analysis	Hematology, parasitology, biochemistry, urine analysis
<i>Key CDC/EID Issues</i>	Different capacities	Basic analysis with para-biological machine		

5. Community/township laboratories				
<i>Types and Number</i>	N/A	768 HC lab with RDT & microscopic 4 Community lab.	324 Small lab, not including some labs in station hospitals	One-person lab
<i>Function/Services</i>	Sometimes rapid test for TB, HIV, malaria, dengue	basic analysis using para biological machine	Microscopy for malaria, TB, rapid test for malaria, TB, HIV if supplies available	Microscopy for malaria, TB, sometimes rapid test for HIV, dengue
<i>Key CDC/EID Issues</i>		Lacking of lab staff		No proper facility
6. Private laboratories				
<i>Types and Number</i>	In all urban locations and some rural locations, probably over 3,000	All 1,044 private clinic and 16 private hospital have their own lab	In major cities and towns	Over 10,000 private labs either in clinics or separate
<i>Function/Services</i>	Patient diagnostics	Lab for diagnostic	Patient care	Patient diagnostics, no public health reporting unless for notifiable diseases
<i>Key Public CDC/EID Issues</i>	No license, no inspection	Many private clinic got license from MoIC and under MoH	Reporting to health department	Insufficient inspection
7. Training institutions for laboratory staff				
Number of Universities		University of Health Science	University of Yangon and Mandalay	
<i>Course/duration/intake</i>		6 years	Bachelor of Medical Technology, 4 years, to be operated by MOE in 1 year	
<i>Key Issues</i>			Not enough skill training, Need to improve biosafety of teaching labs, and provide new equipment, test kits and micropipettes	
Number of Colleges		Faculty of Medical Technology		
<i>Course/duration/intake</i>		4 years course (bachelor)		

		3 years course(semi-bachelor) in SVK		
<i>Key Issues</i>		After MA they can continue study in Medical science technology		
Number of Schools	One Technical School for Medical Care (TSMC) in Phnom Penh	SVK, CPS and LPB	Laboratory technician operated by MOH	
<i>Course/duration/intake</i>	3 years	1,6 years course	1 year	
<i>Key Issues</i>			Insufficient training to work independently in field lab	
8. Blood banks				
<i>Key Issues relating to EID</i>	To define clear linkage with EID (e.g. antimicrobial resistance, infection prevention and control)	National Lao Blood banks under Lao Red Cross scan for HIV, Malaria and STD		

B. GMS LABORATORY SYSTEMS SUMMARY				
System features and performance	Cambodia	Lao PDR	Myanmar	Viet Nam
Strategic Element 1: Developing an operating framework for improving laboratory services				
1. Legal Framework				
<i>Laboratory services policy/strategy for CDC/EID in place?</i>	Yes	Yes	Draft Laboratory Plan	Yes
<i>Legal frameworks for laboratory services quality and biosafety?</i>	Yes	Operational Guideline for Health Lab Network in Laos	No biosafety legislation	Yes
<i>Legal framework for private laboratory services for CDC/EID?</i>	In process	Yes, but could not control	No	Yes
<i>Legal framework for laboratory accreditation</i>	In process, for 25 sites for national and provincial	Yes	No	Yes

<i>and audit?</i>	levels			
<i>Other major legal frameworks of relevance to CDC/EID labs?</i>	Relevance for CDC laws	National strategy CDC lab No. 165 in 2014		
2. Organization				
<i>List MOH Departments managing laboratory services?</i>	Department of Medical Services (Bureau of Medical Laboratory Services)	DHS, HCD, FDD, CDC and Training Dept.	Department of Hospital Services	General Department of Preventive Medicines, Viet Nam Administration of Medical Services
<i>Is there one MOH department overall in charge of lab services?</i>	Yes	No	No	No
<i>Are laboratory services headed by DG or DDG?</i>	No	No	No	No
<i>Is there an active and effective planning structure?</i>	Annual Operational Plan (AOP) development	AOP	AOP	AOP
<i>Is there an active and effective national coordinating committee?</i>	Yes (Sub-technical Working Group on Blood Safety and Laboratory Services: SWGBSLS))	Yes, Dr Phengta Vongphachanh	Yes	Yes
<i>Is there an active and effective technical workgroup/taskforce?</i>	SWGBSLS	Yes, including 16 members	Yes	Yes
<i>Other issues?</i>		Twice meeting a year		
3. Planning, Management, Monitoring				
<i>Is there a comprehensive laboratory development program?</i>	Yes, through the Nat Strategy for Medical Laboratory Services 2015-2020	Yes		Separate for GDPM but now being integrated
<i>Is a laboratory five year plan and budget approved?</i>	No costed plan	Yes		Separate plans
<i>Are laboratory services financed through annual plans?</i>	Yes	No, sometime get sometime no	Yes	Yes

<i>Are lab management /SOPs in place?</i>	Yes	Yes		
<i>Is the laboratory management information system functioning?</i>	Early stage of development, need more logistic support	Not effect to all		
<i>Is there a functioning central lab database system?</i>	To be finalized by the end of 2015	Some time and rarely updated		
<i>Is there monthly reporting to the national oversight agency?</i>	Yes	Yes		
<i>Is action taken based on reported performance of laboratories?</i>	Yes, partially	Some time		
<i>Other issues?</i>				
4. Financing				
<i>Is the annual laboratory budget received in time and sufficient?</i>	Not sufficient	Not on time and not sufficient	Cash flow problems	
<i>If not, what is typically being cut/skipped?</i>	Biosafety, Lab information system, maintenance	Always reagent and equipment	Supplies	Supplies
<i>What % of laboratory budget allocations can be spent annually?</i>	Around 14% in 2015	80%		
<i>What % of the non-salary recurrent budget for laboratory services is financed (i) by government, (ii) by donors, (iii) out of pocket?</i>	Donor support usually in kind, through trainings	23% government 39% donor 38% Out of pocket and other		
<i>Who decides how to spend laboratory allocations?</i>	MOH Management (Minister)	Steering committee	Director	Head of Laboratory
<i>Are sources used in a balanced manner and used efficiently?</i>	Rationalized through the Sub-technical working group on blood safety and laboratory services	No	Yes	Yes
<i>Other issues?</i>				

Strategic Element 2: Reforming and integrating laboratory services				
1. Leadership				
<i>Is there proof of strong leadership and commitment to evidence based decision making including better use of laboratory services?</i>	Yes, National Strategy for Medical Laboratory Services 2015-2020	They said Yes	Yes	Not sure
<i>Is there strong advocacy of senior management on importance of improving quality and biosafety of lab services?</i>	Yes	Not sure	Yes	Yes
<i>Is government committed to sustain laboratory financing?</i>	Yes	No	Yes	Yes
<i>Is government considering contracting out to the private sector?</i>	No	No	No	No
<i>Other issues?</i>	Budget constraint			
2. Strategic Planning				
<i>Is there clear guidance on standards of laboratory services?</i>	yes	Yes	Some	Yes
<i>Are standards based on burden of diseases and expected demand?</i>	Yes, geared towards IHR/APSED	yes	No	Yes
<i>Which laboratories are often seriously underused?</i>	Need more training for improved use by clinicians	Don't have yet	Small laboratories	District Preventive health center laboratories
<i>What mainly explains low demand for lab services, low public demand, private sector competition, limited range of diagnostics, lack of staff, poor quality, limited</i>	Lab services underused by clinicians	Limited range of diagnostics, lack of staff and limited opening hours	Lack of staff an supply	Low demand for services

<i>opening hours?</i>				
<i>Are there mechanisms to rationalize laboratory services?</i>	Yes, through QMS, QA, Biosafety, SOP standards	Yes	Not yet	Plan to integrate district preventive and hospital laboratories
<i>Are there plans to adjust laboratory services to make these more effective and efficient?</i>	Training based on real life situation when an unknown health event occurs → rapid response team, lab, infection control and clinicians working together)	In 5 year plan (2016-20) has several point for improving their services	Build capacity of NPT and Mandalay laboratories to reduce work of NHL	As above
<i>Other issues?</i>				
3. Coordination				
<i>Are roles of various national laboratories clear?</i>	Yes (TORs)	Yes	No	Yes
<i>Are roles clear between levels of laboratory services?</i>	Yes (CPA guidelines)	Yes	No	Yes
<i>Is a specimen referral system in place?</i>	Yes, as specified in Quality Manual	Yes	Weak	Yes
<i>Are there formal links with clinical services?</i>	Yes, in lab with QMS	Yes	Yes	Yes
<i>Is there a regional/global referral for difficult diagnostics?</i>	Yes through IATA, ICAO	Yes	Yes	Yes
<i>Is there a move towards (de)centralized laboratory services?</i>	CPA guidelines: Lab only available at district level	Yes	Yes	No, need to centralize to make more efficient
<i>Are there efforts for horizontal integration of laboratory services – curative and preventive?</i>	Yes, through CAMLIS	Yes, system in place not sufficient fund support	Being discussed	Yes, as above
<i>Is there a move towards integration with the private sector/contracting out?</i>	No	No	No	No
<i>Are there formal links with other laboratories such as</i>	Yes, especially with the Ministry of Agriculture	Yes Quarterly meeting	?	Yes

<i>for animal health, water quality and food product inspection?</i>	(NaVRI)			
<i>Has mapping of stakeholders of lab services been done?</i>	Yes, by the MOH Bureau of Medical Laboratory Services (BMLS)	yes	No	No
<i>Is there effort to improve networking at local, national, regional and international levels for sharing experience and resources?</i>	Yes	In process with international, regularly with local, national and regional	No	No
<i>Is there a coordinating body to create collaboration among partners at local, national, regional and international levels?</i>	Yes, through the Sub-technical working group for blood safety and laboratory services	Yes	No	No
<i>Are GMS countries supporting each other for EID diagnostics</i>	Yes	Yes	Yes	Yes
<i>Other issues?</i>				
4. Evaluation				
<i>Latest comprehensive Lab assessments?</i>	2013- 2014- 2015	5 provinces under EU 2013, 12 provinces under ADB in 2014		
<i>Latest national lab review?</i>	2015 (Nat Strategy 2010-2015→2015-2020)	July 2014		
<i>Is annual plan assessed each year?</i>	Yes, every January	Yes	?	?
<i>Are regular internal laboratory discussions required?</i>	Yes, through sub-technical working groups at all sites with microbiology	Yes	?	?
<i>Are regular laboratory discussions with clinicians required?</i>	Yes	Yes	?	?
<i>Are special studies done like fever study,</i>	Yes, Fever study with NAMRU	Yes	Proposed	Proposed

<i>immunization study to assess effectiveness of disease control programs?</i>				
<i>Is information used efficiently to improve lab services?</i>	Yes, Cambodia Laboratory information system (CAMLIS) under development to support CAMEWARN and anti-microbial resistance (AMR) effort	Yes	No	No
<i>Are there periodic evaluations to measure the degree to which individual laboratories have implemented recommended changes?</i>	Yes, but irregular	Yes, by WHO technician support in NCLE	WHO	WHO
<i>Other issues?</i>	Budget constraint, not enough supervision		Budget constraint	
Strategic Element 3: Improving Biosafety of Laboratories				
<i>Are Biosafety SOPs available?</i>	yes	Yes	No	Yes
<i>Is there regular assessment of all aspects of biosafety?</i>	First assessment in 2015	One a year	No	Yes
<i>Do facilities use biosafety score cards and plan for improvement?</i>	Yes	Yes	No, new hospitals are not compliant with international biosafety standards and need modifications	Yes
<i>List any major biosafety system problems?</i>	No standard BSC, no financial resource for decontamination		Lack of funds, lack of biosafety guideline	
<i>Does every lab has an appointed biosafety person?</i>	Yes, for national referral lab & sites with microbiology	Yes	Yes	Yes

<i>Are in charges of laboratories specially trained in biosafety?</i>	yes	Yes	Yes	Yes
<i>Is there a national training program for biosafety?</i>	No formal curriculum, only short courses ToT from Singapore TA for curriculum development needed	Yes	No	Yes
<i>What proportion of staff is trained/qualifies in biosafety?</i>	All lab staffs at sites with microbiology	100%at national level		All in charges
<i>Are there national standards for design of lab facilities for biosafety including for liquid and solid waste management?</i>	yes	Yes	WHO standards	Yes
<i>What are the main facility problems for biosafety in provincial and district laboratories such as lack of space, facility design, waste management, etc?</i>	No standard	In some province no space for waste management and many district depend on facility design	Outdated facilities, not using protective clothing, improper handling of waste by untrained persons	Waste management
<i>Are there national standards for biosafety equipment of laboratories?</i>	No, TA needed	yes	No	Yes
<i>What are the main equipment shortages for biosafety in labs?</i>	Backup electricity, BSC spare parts	Drainage waste water use the same main drainage	Incinerators	Waste management equipment
<i>Which consumables are mostly out of stock for biosafety?</i>	Not sufficient	Coach, shoe and hand washing liquid	Basic cleaning supplies	Detergents, gloves, brushes, etc.
<i>Other issues?</i>	No budget to certify, not enough training and supervision			

Strategic Element 4: Improving Quality of Laboratory Services				
<i>What hard data are available on lab quality problems?</i>	IQC needed to get data on lab quality			
<i>What are the common problems in quality of lab services?</i>	Levy Jennings Charts	Lack of reagent at national level and at provincial and district lack of clean water supply	Lack of calibration, staff skills, supplies, lack of minor equipment	Staff skills
<i>How does MOH show commitment to address these problems?</i>	Refresher trainings, labs to record data and take corrective actions	Some problems were solved and some could not yet		
<i>Are quality objectives clearly defined and documented?</i>	Yes, in CPA guidelines	Not all were recorded	No	Yes
<i>Is the lab QI design clear and understood within MOH?</i>	Yes, as stated in the national strategic plan 2015-2020	Yes		Not sure
<i>For which levels is a quality improvement plan being rolled out?</i>	National referral labs & CPA3+microbiology labs	Central and provinces	Central	Provinces
<i>Are protocols and SOPs available for IQC?</i>	Yes	Yes	no	Yes
<i>Are protocols and SOPs for IQC available on line?</i>	Not yet, to be synchronized to become standard	No	no	
<i>What % of labs has satisfactory IQC > 50%, 80% in 2014?</i>	2015: 44% for biochemistry 61% for hematology	80%		
<i>What are the major issues in implementing IQC?</i>	Trainings, support reagents	Long time of transport specimen		
<i>What % of labs were examined in external quality assurance?</i>	31 out of 89 labs (34%)	5%	HIV QA done, but not available in visited labs NHL does periodic QA	
<i>What % of examined labs has satisfactory EQA > 50%, 80%?</i>	2014: Bacterio: 100% Serology: 100% Hemato: 49% Biochemistry: 74%	85%		

<i>What are the major issues in implementing EQA?</i>	Refresher trainings; follow up	High cost of transport and fee		
<i>What % of labs are ISO certified at what level</i>	Not yet	90% WHO		NIHE: nil Provincial level: 25%
<i>Is there a laboratory audit system in place up to what level</i>	Internal: working group External: not yet available	Yes for basic	No audit system in place	No
<i>Is laboratory registration and accreditation required for public and private laboratory services</i>	Yes	Yes in rule not all practices	Yes	Yes but not in practice
<i>Is there a registration and accreditation agency</i>	MOH Department of Hospital Services (mostly registration)	Yes	Department of Hospital Services	VAMS
<i>What % of private laboratories are registered and accredited?</i>		25%		
<i>Other issues?</i>	Improve private sector, QMS, Bio-safety			

Strategic Element 5: Improving Laboratory Resources

1. Staff

<i>Is there an approved HRD plan for laboratory services?</i>	Yes. The national Examination. For 2015, a total of 1,030 lab technicians trained. MOH intake: 18 among all the 433 staffs approved by the Government	Yes	No	Yes
<i>Is there a personnel management system for lab staff?</i>	Yes	Yes	No	Part of general system
<i>What are the major documented issues in HRD in laboratory services, e.g., lack of lab</i>	Lack of staff at lower level	lack of staff at lower level, lack of lab managers, low pay, staff quality	Lack of qualified staff at lower level	Staff constraints at lower level

<i>managers, lack of staff at lower level, shortage of specific cadres, staff drain to private sector, staff motivation, lack of career opportunity, low pay, staff quality?</i>				
What are MOH priorities to be addressed?	Staff quality/quantity as per CPA guidelines (CPA1: 3; CPA2:3-5; CPA3: 6-8)	Improve staff quality at low level	Staff quality	Staff quality
<i>Other issues?</i>				
2. Pre-service Education				
<i>Is there coordination with MOE on standard curriculums?</i>	Yes, for curriculum update	Yes but school is under MOH	Yes, higher level training done by MOE, lower level by MOH	
<i>How many students enter lab studies annually all levels?</i>	2015: 18 lab staffs/MOH total 433)	70 to 100		
<i>Do students have sufficient basic science preparation?</i>	Insufficient	Insufficient	Insufficient	Insufficient
<i>Are there major shortages of staff, facilities, equipment, supplies?</i>	Yes	shortages of facilities, equipment, supplies	Yes	No
<i>Are exams serious and rigorous?</i>	No, support by JICA, US CDC, but not strict	Not all, some	Yes	Yes
<i>Are government positions available after graduation?</i>	18/433 (2015)	Not all student, many position available in province and district; student not prefer to go far from home	Yes	Yes
<i>Are schools certified and inspected annually?</i>	Yes, but irregular	Yes	No	No
<i>Other issues?</i>				

3. In-service Training				
<i>Is in-service training ad hoc driven or follows agreed annual plan?</i>	both	Some		
<i>Average staff training per year as % of total staff?</i>	In 2013-2014: 120 lab staff trained in bio-safety; 2015: 15 staff each trained on hemato & bio-chemistry (July 2015: MOH staff=20,811 with 491 secondary lab staff and 72 primary lab staff)	3%		
<i>Mostly class room or practical training?</i>	both	Yes		
<i>What % of labs have NGO partnership or mentoring?</i>	Specific to NGO area of support	30%		
<i>Are there on-line training programs?</i>	no	No		
<i>Other issues?</i>		At NCLE has on job train by WHO lab technical staff other lab no		
4. Equipment				
<i>Is there a standard essential equipment for each level?</i>		Yes	Yes	
<i>What are common equipment items lacking in many laboratories?</i>		Central level not many thing In province still have	Most items available	
<i>What are common reasons for low use of equipment?</i>		Not existing of how often used Check for using purpose	Lack of skilled staff	
<i>Are purchased equipments often of substandard quality?</i>		Yes, often	No, purchased equipment is appropriate	

<i>How can the procurement of quality equipment be assured?</i>		Procurement based on specification	Maintain technical selection committee	
<i>Is there a system for equipment maintenance and calibration?</i>		Yes	Centralized, needs training of staff to do their own calibration	Yes, maintenance contracted out for some equipment, and team goes round to calibrate biosafety cabinets
<i>Is equipment being leased?</i>	No	No, not leased	No	No
<i>Are there qualified staff trained in preventive maintenance?</i>		Based on SOPs after trained	Yes but few	
<i>Are there SOPs for maintenance and calibration?</i>		Yes	Yes but not widely used	
<i>Other issues?</i>				
5. Supplies				
<i>Is there a standard list of supplies for various levels of labs?</i>	Yes (standard tests for each CPA level)	Yes, for EU project and some ADB	Yes	
<i>Which are the major stock outs for laboratory services – reagents, glassware, PPE, rapid tests?</i>	Mostly reagents to run IQC tests	Some stock out of PPE in province, NCLE stock out of some reagents		
<i>Is there a national stock keeping system for lab supplies?</i>	Yes, at Central Medical Store	No		
<i>Are lab supplies purchased directly from the private sector?</i>	Centrally procured if from MOH, direct purchase if from HEF	Depend on project procurement		
<i>Are lab supplies mainly paid from patient fees?</i>	About 70% covered by MOH	No		
<i>Are supplies properly stored?</i>	Yes	Yes		
<i>How are supplies disposed of If out of date?</i>	N/A: Supplies are to be used before expiry date	Specimen for training		

<i>% need covered for rapid tests for malaria, HIV, TB, and dengue?</i>	Dengue: 100 tests/year	90%		
<i>Are particular tests missing?</i>	Dengue	Provincial level assessment needs		
<i>Other issues?</i>				
6. Technical assistance				
<i>Agencies providing major funding</i>	WHO, DMDP (Developing Microbiology Diagnostic Program), Mérieux Foundation, USCD, NAMRU2	ADB, EU, WHO, CDC(USAID)		
<i>Agencies providing technical support</i>	WHO, DMDP, TLL (Temasek Life science Laboratory), AFRIMS	EU, ADB, WHO, CDC(USAID) NIED(Japan)		
<i>Are there NGOs/INGOs/experts providing mentoring</i>	US CDC, ITECH, DMDP,	5 TA		
<i>Are lab staffs regularly engaged in technical associations, networks, community of practice?</i>	Newly created Lab Association (Chair: Pharm. Ket Vansith)	Yes		
<i>Are lab staffs regularly exposed to workshops, formal meetings, professional discussions, web sites?</i>	Yes	Yes		
<i>Other issues?</i>	Coordination/synchronization			

C. GMS PUBLIC LABORATORY ASSESSMENT SUMMARY				
Equipment and Supplies	Cambodia	Lao PDR	Myanmar	Viet Nam
National/Regional Public Health Laboratories (add any other major lab if this is a MOH priority)				
<i>List major items of equipment not available, not functioning, or old.</i>		Inventory list a NCLE Provincial level some existed list		
<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Zika virus		
<i>List gaps in staffing.</i>				
<i>List safety equipment (e.g. washing machine, autoclave, PPE, not available, not operational or old.</i>		NCLE- autoclave Province- autoclave needs for more purpose use at least two per each lab		
<i>List safety supplies in short supply incl PPE, gowns.</i>				
Regional/State, Provincial, and District Laboratories, (select questions as applicable, sample range of facilities)				
1. Biosafety				
<i>Is lab space adequate?</i>		not for biosafety		
<i>Can all doors and windows be closed?</i>		Some new hospital could closed, not for old hospital		
<i>Is Laboratory air conditioned?</i>		Yes, some		
<i>Are PPE, lab shoes, cabinets and wash-up available at entrance?</i>		Not all lab in provincial hospital		
<i>Is laboratory clean</i>		Some laboratory at		

<i>(e.g., benches, corners, alcoves for storage)?</i>		provincial hospital		
<i>Is equipment clean (e.g., micropipettes, fridge)</i>		Yes		
<i>List biosafety equipment (e.g. autoclave, personal protective equipment) not available, not operational, or old?</i>		Yes existing for 5 provinces of EU project in attached file		
<i>List shortages of biosafety disposables?</i>		No		
<i>Is there a functioning system of liquid waste management</i>		Yes		
<i>Is there a functioning system of solid waste management?</i>		Yes		
<i>Is solid waste first autoclaved?</i>		NCLE yes, Some 5 provinces only		
<i>Is solid waste burned?</i>		Some burned some throw with public waste		
<i>Is incinerator working and up to standard</i>		Some province of EU project and some of big province (LPB, VT province)		
<i>Is solid waste dumped in compound or where?</i>		In compound dumped		
<i>When was last staff training for biosafety?</i>		May 2015 in 5 provinces only, March to May 2015 for all		
<i>Who is in charge of biosafety?</i>		Dr Noi Kaseumy Biosafety officer in each province		

<i>List any other problem in biosafety.</i>		Municipality waste dumped in compound is not aware of biosafety in town No, existing biosafety law for legacy safety to population(lawyer for drafting) No quality of biosafety standard in each health facilities		
2. Range of Laboratory services				
<i>Is there a plan for lab development?</i>		Yes		
<i>List gaps in staffing.</i>		Will support list later		
<i>List critical diagnostic assays not available.</i>		Zika		
<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Will support list later		
<i>List major items of equipment not available, not functioning, or old.</i>		Autoclave not enough because two are broken		
<i>List lack of supportive equipment like fridges, transport box, stools.</i>		Will support list later, almost complete items for all province		
<i>List lack of testing supplies including reagents, rapid tests, disposable labware.</i>		Will support list later		
<i>How many tests per month total?</i>		800 tests per month		
<i>List top five diagnostics.</i>		Influenza, Dengue, Stool culture, Gen.pack culture		

		and meales		
<i>How many referrals per month?</i>		NCLE, some		
<i>Referrals for what?</i>		For quality assurance		
3. Quality of Laboratory services				
<i>List gaps in in-service training for all staff.</i>		On the job train on quality 6 provinces (EU+KM) on quality assurance		
<i>List gaps in quality improvement program.</i>		NCLE- drafting standard of quality improvement program		
<i>List gaps in SOPs.</i>		Yes , existing		
<i>List gaps in equipment manuals.</i>		Yes, not completed		
<i>When micropipettes were calibrated last?</i>		More than one year		
<i>Maintenance and calibration records available for equipment?</i>		No, just small supported from EU		
<i>List problems in calibrating equipment.</i>		NO		
<i>List problems in maintaining equipment.</i>		Yes		
<i>List gaps in quality assurance program.</i>		NO		
<i>Is most equipment available?</i>		Some		
<i>Are many equipments due for replacement?</i>		Several equipment need replacement		
<i>Who maintains, contracting out?</i>		No		
<i>Leased equipment?</i>		Not available		
<i>Is there a budget for maintenance?</i>		NO		

<i>Is laboratory i/c monitoring lab performance?</i>		No		
<i>Any other issues?</i>				
4. Laboratory Management				
<i>Level and years of experience of Lab in charge?</i>		1998 as EPI and lab		
<i>Is there an annual lab plan and budget?</i>		Yes		
<i>Are SOPs available for Lab management?</i>		No		
<i>Is there record of Lab management meetings?</i>		Weekly meeting (minutes)		
<i>Is there a system of Lab staff supervision?</i>		Yes		
<i>Is computer and internet available?</i>		Yes		
<i>Are monthly reports submitted as required?</i>		Yes		
<i>What proportion of lab services is financed by government, partners and out of pocket?</i>		23% government 39% donor 38% Out of pocket and other		
<i>List gaps in financing.</i>				
<i>Has the lab been certified/accredited?</i>		National influenza center, National Meals center and JE(WHO)		
<i>Has the lab been audited?</i>		Yes, on program based		
Community laboratories				
<i>Type of available staff?</i>		Yes, 3 staff each District		
<i>Cleanliness?</i>		Not up to standard		
<i>Lab gowns available?</i>		Yes		
<i>Microscope working?</i>		Yes		

<i>Microscopy supplies incl reagents and collection supplies?</i>		yes		
<i>Power stabilizers and battery?</i>		No		
<i>Malaria rapid test?</i>		No		
<i>Dengue rapid test?</i>		No		
<i>Transport box?</i>		EPI box		
<i>Other tests?</i>		Paraclinic blood test		
<i>How many tests per months total?</i>		?		
<i>How many referrals?</i>		?		
Technical Schools				
<i>Benches and stools?</i>	Not enough	Yes	Yes	Yes
<i>AV equipment?</i>	Yes	Yes	Yes	Yes
<i>Computers?</i>	Not enough	Yes	Not enough	Yes
<i>Teaching microscopes?</i>	Not enough	Not enough	Not enough	Not enough
<i>Microscopes?</i>	Yes	Yes	Yes	Yes
<i>Weighing scale??</i>	Yes	Yes	Yes	Yes
<i>Centrifuge?</i>	Yes	Yes	Yes	Yes
<i>Water bath?</i>	Yes	Yes	Yes	Yes
<i>Hematocrit reader?</i>	Yes	no	Yes	Yes
<i>Micropipettes?</i>	Not enough	Not enough	Not enough	Not enough
<i>Reagents?</i>	Not enough	Not enough	Not enough	Not enough
<i>Rapid tests?</i>	Not enough	No	Not enough	Not enough
<i>PPE?</i>	Not enough/old	No	Old	Yes
<i>Biosafety teaching material?</i>	Yes	Yes	Yes	Yes
<i>Laboratory manual?</i>	Yes	Yes	Yes	Yes
<i>Laboratory SOP?</i>	Few	Few	Some	Most

Project number: 48118-REG

**R-PPTA 8842: THE GREATER MEKONG
SUBREGION HEALTH SECURITY PROJECT**

Table of Content

Acronyms	1
Executive Summary	2
I. Introduction	4
a. <i>Assignment</i>	4
b. <i>Project summary</i>	4
II. Major public health problems	5
a. <i>Epidemiology</i>	5
b. <i>Demand for laboratory services</i>	7
III. Organization, Policies and Plans	7
a. <i>Organization</i>	7
b. <i>Policies and Plans</i>	8
c. <i>Progress</i>	8
IV. Situation Analysis	9
a. <i>Overall Assessment</i>	9
b. <i>Facilities and Biosafety</i>	9
c. <i>Laboratory services</i>	10
d. <i>Quality improvement</i>	10
e. <i>Support services</i>	11
V. Proposal	12
a. <i>Overall priorities</i>	12
b. <i>Facilities and biosafety</i>	12
c. <i>Laboratory services</i>	12
d. <i>Quality improvement</i>	13
e. <i>Support services</i>	14
VI. Implementation and Monitoring	14
a. <i>Implementation</i>	14
b. <i>Monitoring</i>	15
VII. Conclusion	16
Appendix 1: Laboratory Summary Matrix	17

Acronyms

ADB	—	Asian Development Bank
AIDS	—	acquired immunodeficiency syndrome
APSED	—	Asia Pacific Strategy for Emerging Diseases
BSL	—	biosafety level
CDC	—	communicable diseases control
CLMV	—	Cambodia, Lao PDR, Myanmar, Viet Nam
DCDC	—	Department of Communicable Diseases Control
DPIC	—	Department of Planning and International Cooperation
DHC	—	Department of Health Care
EID	—	emerging Infectious disease
EPI	—	expanded program of immunization
EQA	—	external quality assessment
EQAP	—	external quality assessment program
GDP	—	gross domestic product
GMS	—	Greater Mekong Subregion
HIV	—	human immunodeficiency virus
IHR	—	International Health Regulations
MEV	—	migrants and mobile people, ethnic minorities, and other vulnerable groups
MOH	—	Ministry of Health
NCLE	—	National Center for Laboratory and Epidemiology
SARS	—	severe acute respiratory syndrome
SLIPTA	—	System for Laboratory Quality Improvement Process Towards Accreditation
SOPS	—	standard operating procedures
TA	—	technical assistance
TB	—	tuberculosis
WHO	—	World Health Organization

Executive Summary

This report summarizes the assessment of laboratory services for the Greater Mekong Subregion (GMS) Health Security Project (the Project) of Cambodia, Lao PDR, Myanmar, and Viet Nam. It was prepared by the international laboratory quality improvement specialist and team members as part of the project preparation of the Asian Development Bank (ADB).

The Project will focus on regional cooperation and disease control in border areas, strengthening disease surveillance and outbreak response, and improving laboratory services and infection control in hospitals. In Lao PDR, the Ministry of Health (MOH) will be the executing agency. The Department of Planning and International Cooperation (DPIC), the Department of Communicable Diseases Control, the Department of Health Care, the National Center for Laboratory and Epidemiology, and 12 provincial health offices will implement the Project in 12 provinces). Total project costs in Lao are estimated at \$12.6 million

The Lao People's Democratic Republic (Lao PDR), a low population density and resource-rich country of about 7 million people in 2015, is located in the center of the GMS and surrounded by major economies. It has recently seen an increase in small scale industries, plantations and services thereby increasing employment, connectivity, migration and urbanization.

The country has a relatively large burden of infectious diseases: it has outbreaks of emerging infectious diseases, a large burden of tuberculosis and dengue, a residual malaria problem, and a concentrated HIV epidemic. Common communicable diseases remain the major burden among children and the poor. Hospital-based infections and drug resistance are emerging public health problem. All these constitute major public health and economic risks.

Despite an extensive network of health services, a large share of the population, including many poor and isolated ethnic groups, do not access formal health services, because of problems of access, affordability, acceptability, and quality of care. This situation particularly concerns laboratory services which on paper are quite extensive but face serious staff and other resource concerns. Hence there are gaps in diagnostics for surveillance, prevention, control, and management of infectious diseases, in particular in border areas and industrial zones, which makes it hard to manage health services.

Lao PDR is committed to implement the international health regulations (IHR) and the Asia Pacific Strategy for Emerging Diseases (APSED), and implement regional strategies for the control of major diseases such as dengue, malaria, tuberculosis and HIV/AIDS; and the strengthening of laboratory services. Despite major political and technical support and investments of partners including the Asian Development Bank (ADB), insufficient effort is made for the control of these diseases, and Lao PDR is yet to comply with IHR due in 2016. MOH has developed a national laboratory policy and strategic plan which is partially rolled out given serious human and other resource constraints. MOH needs to first focus on biosafety and quality of laboratory services before considering to expanding the already overstretched laboratory services further.

One priority area is improving diagnostic capacity for evidence-based decision making. For MOH to have confidence in communicable disease data and to be able to plan and evaluate responses to outbreaks, it requires a reliable diagnostic laboratory system staffed by appropriately trained staff working in facilities that are safe for staff and which pose no threat to the community. During this TA, discussions with stakeholders, field visits and document review identified gaps in laboratory services, and priorities for investment under this Project.

Based on the WHO regional plan for strengthening laboratory services, MOH has developed a national laboratory strategy and plan which is being rolled out in phases. Following an initial focus on upgrading the 5 larger provincial laboratories with a referral function, MOH is now planning to upgrade other provincial laboratories, as well as improve basic laboratory services at district level. The Project will support improving biosafety and quality of laboratory services in 12 out of 18 provinces in Lao PDR, and also strengthen quality inputs such as laboratory planning, guidelines, standard operating procedures, and networking.

I. Introduction

a. Assignment

1. To identify gaps in laboratory services within the context of regional public health security, an international laboratory quality improvement consultant, with help of team members, carried out a laboratory review in the 4 countries. As reported, this included (i) a general subsector review to assess strategic approach and progress in laboratory services, (ii) identification of priorities and gaps in laboratory services in the project area, (iii) formulation and cost estimates of interventions, and (iv) identification of implementation risks and arrangements. The sector summary matrix is attached to the CLMV laboratory reports. Equipment details are in the procurement plans.

b. Project summary

2. Under the GMS economic development program, ADB has been supporting various health projects for communicable diseases control (CDC), HIV, Malaria, and related regional technical assistance.¹ The Governments of Viet Nam, Cambodia, Lao PDR, and Myanmar and ADB have prepared the Project to strengthen national health security systems and regional cooperation for the prevention and control of EIDs and other diseases of regional importance in the GMS, and help countries to comply with IHR 2005 and implement APSED of the WHO.²

3. The proposed project goal is strengthened GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities, (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year, and (iii) increased use of public health services in border areas by MEVs. The proposed project outcomes are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed project outputs are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed project targets 12 provinces in the Lao PDR along the borders and economic corridors with China, Cambodia, Thailand and Viet Nam.

4. MOH has made progress with regional information sharing and cross-border cooperation for CDC. However, this needs to be mainstreamed and formalized. In addition, some groups of MEVs that are more likely to get and spread infectious diseases are not using regular health services. Under the first output, the Project (i) supports regional, cross-border, and inter-sectoral information sharing and coordination of outbreak control among GMS countries, (ii) develops regional disease control strategies and evidence-based CDC, and (iii) improves CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for joint planning and monitoring; and outreach and community mobilization to reach and engage MEVs.

5. MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis is strong. However, the system needs to be further computerized and extended to communities by employing syndromic reporting. Linkages or integration among surveillance systems will also be improved. MOH also needs to improve

¹ Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

² World Health Organization. Asia Pacific Strategy for Emerging Diseases. 2010.

capacity for disease outbreak response. Under the second output, the Project supports (i) syndromic reporting at community level, (ii) web-based reporting including information technology support, (iii) integration of surveillance systems, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport, and (vi) improving screening and quarantine capacity at border posts of entry and international quarantine centers. Support is needed for system design, computers, training, and vehicles and equipment for outbreak control.

6. District facilities are unable to comply with internationally acceptable levels of biosafety or to guarantee the accuracy of their laboratory testing.. Underlying problems are substandard training of laboratory staff, lack of quality control, and insufficient facilities, equipment, and supplies. The quality assurance system is in a nascent stage, and there is no national laboratory audit system. Nosocomial or hospital-acquired infections are becoming a major public health problem. Under the third output, the Project supports (i) improving quality assurance, (iii) in-service training, (iv) improving district laboratory services, and (iv) equipment and training for infection control and case management of dangerous diseases.

7. In the Lao PDR, the Project is estimated to cost \$12.6 million including \$8 million in grant and \$4 million in loan from ADB. MOH, is the Executing Agency. A project management unit (PMU) will be established in DPIC. DPIC, DCDC, DHC, and NCLE, together with 12 provincial health offices, will implement the project in 12 provinces (Phongsaly, Luangnamtha, Bokeo, Udomxay, Xiengkhuang and Huaphanh in the north; Bolikhamsay and Khammuane in the center, and Champasack, Attapeu, Saravane, and Sekong in the south). The Project will be implemented over a period of 5-year period beginning early 2017. The project completion date is 30 June 2022.

II. Major public health problems

a. Epidemiology

8. Globally, all countries are at risk of outbreaks of emerging infectious diseases (EIDs). The International Health Regulations (IHR), 2005, of the World Health Organization (WHO) mandates all countries to improve health security against EIDs. The Asia Pacific Strategy for Emerging Disease (APSED), 2010, of the WHO regional offices identifies 10 strategic areas for compliance by not later than 2016. At present, compliance has reached about 70-80% in the region, with specific gaps mainly relating to laboratory services, hospital infection control, and cooperation for outbreak prevention and control with communities, other sectors, and countries.

9. The Lao PDR, located in South-east Asia and close to major population hubs with biosafety problems, has been identified as being a potential site for likely outbreaks of emerging infectious diseases (EID) such as SARS, highly pathogenic influenza, or Ebola hemorrhagic fever, with pandemic potential that may result in major mortality and economic meltdown. The Lao PDR is particular vulnerable because its health system is still weak.³ It has developed extensive infrastructure in the past 40 years, but poor access, limited rural staff capacity, and financial constraints affect sector performance. Hence, in addition to making efforts to strengthen provincial and district capacities, the Government is making major efforts to reach out to villages and improve village capacity to address health problems, including prevention and control of infectious diseases.

³ WHO, MOH. 2012. *Lao PDR Health Service Delivery Profile*; WHO. 2014. *Country Cooperation Strategy, Lao PDR*.

10. While the burden of communicable diseases have declined overall in the Lao PDR, communicable diseases represent about one third of the total burden of disease and are the major burden among children and the poor. In addition, there are new risks for the spread of communicable diseases because of (i) improved connectivity, (ii) urbanization, industrialization with associated slum formation and labor camps, (iii) increased drug resistance, particularly for hospital infections, TB, malaria and HIV, (iv) reduced compliance with preventive measures like vaccination, and (v) emerging and re-emerging diseases for which control measures are still being developed. The incidence of dengue has steadily increased, mostly in children. Outbreaks of diarrheal diseases and other highly infectious conditions are also a major burden. Immunizable diseases remain common due to low immunization coverage among poor rural children.

11. The following contribute significantly to the burden of communicable diseases.

- Lack of water and sanitation, in particular among the poor
- Some groups are not accessing services, in particular for remote ethnic groups;
- New threats that may reverse the burden of CD, in particular in economic zones:
 - Increased drug resistance, particularly in TB, malaria and HIV
 - Industrialization and urbanization with associated migration, slums, and changing lifestyle
 - Reduced compliance with preventive measures like vaccination.
 - Emerging and re-emerging diseases for which control measures are still being developed.

Emerging diseases

12. Lao has been identified as being at high risk of being the site of an outbreak of an emerging disease, including one with pandemic potential. In 2003, Lao was one of 37 countries affected by the SARS pandemic. In 2004, Lao PDR recorded highly pathogenic avian influenza virus in poultry and its first cases of human H5N1 avian influenza with a mortality/morbidity ratio of above 50% in humans. In 2009, influenza A (H1N1, "swine flu") caused another epidemic in Lao PDR.

Epidemic diseases

13. While Lao has had some success in the control and prevention of communicable diseases such as dengue fever, malaria, HIV, TB, cholera and acute diarrhea, the risk of outbreaks remain. Dengue fever outbreaks occur every year with the peak period from June to December. The incidence of dengue/100,000 population is increasing over time. Most cases occur in those less than 15 years of age and in the urban centers and southern provinces of Lao PDR

Vaccine preventable infectious diseases

14. The incidence and mortality of diseases covered by the expanded program of immunization (EPI) have fallen significantly in recent years. Furthermore, there is not a broad understanding of the importance of herd immunity in preventing outbreaks of communicable diseases. The recent polio outbreak in Lao PDR is a clear example of what can happen when levels of herd immunity are not reached or fall. Surveillance for, and the ability to diagnose, diseases covered by EPI will need to be maintained because the immunization coverage targets have not been achieved for poor children, children living in remote, outlying areas, and children in migrant households.

b. Demand for laboratory services

15. There are two principal sources of demand for laboratory services. The first is for information which will inform treatment of the patient and the second is for information which is of public health significance and should drive outbreak responses and Government policy. Sixty to seventy per cent of health costs in Lao PDR are borne by the patient so the demand for laboratory services is driven, principally, by economic factors i.e. the ability of a patient to pay for the testing. External funding, principally from the Global Fund, ensures a reasonably comprehensive laboratory diagnostic service for HIV, TB and malaria. Almost all other laboratory testing is dependent on the ability of the patient to pay or ad hoc support by external funding agencies.

16. The current situation does not reflect what the demand for laboratory services should be. A case could be made for the provision of free laboratory testing for diseases (in addition to HIV, TB and malaria) that are of major public health significance e.g. dengue, leptospirosis, vaccine preventable diseases, antimicrobial resistance etc.⁴ It is not necessary to provide comprehensive laboratory testing for these diseases in order to be able to identify significant problems with emerging antimicrobial resistance, systematic failures in the pediatric immunization program, to respond to outbreaks and to evaluate the effectiveness of responses. For example, the 2016-2020 WHO Regional Dengue Control Plan is considering recommending systematic testing of only 10% of suspected dengue cases.

III. Organization, Policies and Plans

a. Organization

17. Within MOH, Laboratory diagnostic capacity extends from the National Centre for Laboratories and Epidemiology (NCLE) in Vientiane, which is a national tertiary referral facility through 4 Regional Hospitals and 12 Provincial Hospitals to 130 District Hospitals (A and B) NCLE reports to the Department of Communicable Disease Control in the MOH. There is further fragmentation within the diagnostic system with malaria, HIV and tuberculosis often operating within frameworks separate from the main diagnostic one. The military have their own laboratory services, and the private sector also has either clinic attached or free standing laboratory services.

18. The NCLE is a BSL2+ Laboratory. While MOH is aspiring to have a BSL3 laboratory, the maintenance costs have been prohibitive, and MOH is relying on the Lao Pasteur Institute for such diagnostics. However, the Government does operate cultivation of dangerous viruses. in the animal health laboratories, which is of public health concern given local conditions.

⁴ Mayxay M et al. 2014. *Causes of non-malarial fever in Laos: a prospective study*. Dittrich S et al. 2015. *Orientia, rickettsia, and leptospira pathogens as causes of CNS infections in Laos: a prospective study*. The Lancet. Mayxay M. et al. 2015. *Causes of fever in rural southern Laos*. Am j trop med hyg. Schratz A et al. 2010. *Neglected Diseases and Ethnic Minorities in the Western Pacific Region: Exploring the Links*. In Advances in Parasitology.

b. Policies and Plans

19. The overarching policy drivers for Lao Communicable Disease Control activities are the International Health Regulations (IHR) and the Asia Pacific Strategy for Emerging Diseases (APSED). Lao PDR struggles to meet these commitments. These two documents were distilled into a National Work Plan for Emerging Infectious Diseases, 2007-2010 but it is unclear whether there is a more recent version of this Work Plan. In line with the WHO regional strategy for strengthening laboratory services, Lao PDR MOH has a National Policy for Health Laboratories and a Health Laboratory Services of Laos, National Strategic Plan 2012-2017 as well as a Health Technology Policy. Health technologies are regulated by the Medical Products Supply Centre but the allocation of the technologies is the responsibility of the Department of Health Care. It is not clear how far into the laboratory diagnostics area this administrative oversight has extended. Strategic Priority 3 of the WHO Country Co-operation Strategic Agenda 2012-2015 is: Prevent and control infectious diseases and public health events. These include emerging and re-emerging diseases and food-safety. This complements the objectives of the proposed GMS Health Security project.

20. WHO has translated the WHO Biosafety Guidelines into Lao and the document is now available for distribution. MOH, with the assistance of WHO, has developed a draft Lao National Quality Standard that is based on the international standard ISO 15189 Medical laboratories — Particular requirements for quality and competence. In the course of the ADB CDC II project, staff from the MOH, the National Centre for Laboratory and Epidemiology (NCLE) and WHO convened a number of meetings to develop a template for the development of Standard Operating Procedures (SOPS) for use in laboratories throughout Laos. This process should be reviewed, rejuvenated if necessary, and extended.

21. In addition to support from WHO, there are other partners active within this project scope. The U.S. Defence Threat Reduction Agency (DITRA) is funding the University of Washington International Training and Education Centre for Health (I-TECH) to implement these standards (ISO 15189) in a number of Lao Provincial Laboratories (Luang Namtha, Oudomxay, Luang Prabang, Champasak, Savannakhet) using the WHO Laboratory Quality Stepwise Implementation Tool.

c. Progress

22. The implementation of these plans is extremely patchy and being driven, principally by WHO. Given the staffing constraints within WHO, there is no guarantee that this support/management/ co-ordination will continue. There are multiple players in this space, often providing similar training to the same facility. Much of the training is passive learning and resultant competencies are not assessed. It is not clear how many of the gains will be sustained.

IV. Situation Analysis

a. Overall Assessment

23. The Lao PDR diagnostic laboratory system is extremely fragile and uncoordinated but with some significant strengths at NCLE and the four Regional Hospital Laboratories.⁵

24. The training of Medical Scientists is under-resourced resulting in graduates who do not have the competencies required when they first enter the workforce, the effectiveness of existing in-service training is not assessed and there are severe staff shortages due to a freeze on hiring. Many Doctors at the Provincial and District levels have never heard of diseases like Leptospirosis, Brucellosis, many of the Neglected Tropical Diseases or many of the agents responsible for diarrheal diseases (i.e. food borne diseases). They also lack the training to interpret the results of serological tests or to collect appropriate diagnostic samples. There is an almost impenetrable divide between many Doctors and laboratory staff that hampers appropriate laboratory testing and reliable interpretation of data

25. With the exception of the laboratories mentioned above, many laboratories are unsafe and do not comply with internationally accepted standards of biosafety. Of particular concern is the practice of taking laboratory clothing home to be washed. This poses an immense risk to the community in the event of an outbreak of SARS, MersCoV etc. There are few, if any, Quality processes in place to ensure the correct results are being obtained for diagnostic tests or that equipment is being maintained and calibrated.

26. There is no link between the reporting of the 17 national notifiable diseases and the results of the laboratory testing on many of these patients. This failure to validate communicable disease reports appears to be a lost opportunity and a failure to obtain maximum value from some valuable resources. The failure to utilize the laboratory data also impedes the systematic evaluation of interventions and the development of evidence based responses to outbreaks.

b. Facilities and Biosafety

27. A number of laboratories in the previous ADB CDCII project were barely fit for purpose and require/required significant renovation. There was neither the time nor resources to review all laboratories to be covered by this project. New sites chosen for this project also may require urgent refurbishment to make them safe. All project laboratories should be assessed in Year 1 by the National and International Laboratory Consultants, before any equipment is purchased, to determine needs (other agencies may have provided key equipment recently) and the capacity to accommodate any proposed equipment purchases.

28. The biosafety guidelines that were translated into Lao by WHO need to be widely distributed so laboratory staff have some clear guidelines as to what they need to do to develop a safe working environment and safe working processes. Waste disposal, even if the waste has been autoclaved or disinfected, is ad hoc. This issue must be addressed at a national level and decisions made as to whether waste is to be buried or burned and where this is to take place. Hospital grounds are not an appropriate site for waste disposal.

⁵ Asia Pacific Observatory on Health Systems and Policies. 2014. *Health Systems in Transition: The Lao People's Democratic Republic Health System Review*.

29. Biosafety training should be an integral part of all laboratory workshops and the compliance with biosafety guidelines should be assessed as part of the initial and annual visits to each laboratory by the National and International Laboratory consultants.

c. Laboratory services

30. With the possible exception of HIV, TB and malaria, Lao PDR MOH cannot guarantee the accuracy of any testing for communicable diseases in its laboratories.

31. Significant amounts of equipment were purchased by ADB towards the end of the previous CDC project. The utilization and maintenance of this equipment should be assessed before plans and specifications are developed for further purchases. The need for, and ability to accommodate and use, additional equipment and equipment for new project sites should be assessed by the International and National Laboratory Consultants prior to any purchases being made. There should be a clear link between the equipment being purchased and the aims of this project..

32. CDC II provided key equipment to a number of Provincial laboratories to enable them to undertake communicable disease diagnostic activities safely and reliably. While there should not be the same requirement for large items of equipment for these laboratories in CDC III, it is important to provide the “soft” items that will enable fuller use of these earlier investments in equipment. Such expenditure might include replacement of all non-functional micropipettes; purchase of PPE (laboratory shoes, laboratory gowns, safety glasses) for all staff; purchase of an extended range of locally relevant point-of-care tests; support to prepare standard operating procedures (SOPs) for all diagnostic activities and equipment; development of internal (within the laboratory) Quality Assurance processes.

33. Two drivers for the purchase of new equipment should be quality and safety – every Scientist should be using a clean, calibrated, micropipette and tips that have not been recycled. They should be using tests/reagents that are in date and able to provide results of the highest sensitivity and specificity. They should be wearing a lab gown, closed toe shoes and have access to gloves and safety glasses. If they are performing procedures that could generate infectious aerosols, they should have access to a class II Biohazard Cabinet. There should be a functional autoclave for the sterilization of all biological waste.

34. All procedures should be described by a standard operating procedure (SOP) that describes all Quality processes related to the procedure described in the SOP.

35. The variety and size of some equipment in diagnostic laboratories makes centralized repair and maintenance unrealistic. The Quality processes proposed will identify failures in equipment calibration and most of these failures could be addressed by the operator, on site, if they are trained properly when equipment is purchased. Any purchase of class II biohazard cabinets must be accompanied by a budget for annual calibration by an approved tester. As the number of such cabinets in Lao increases, MOH should consider having a small team trained and equipped to undertake this calibration on all hoods annually. Vietnam MOH has done this.

d. Quality improvement

36. CDC2 co-ordinated the preparation of a nationally agreed SOP template for use in MOH laboratories. It is not clear how extensive SOP preparation in MOH laboratories has been.

37. WHO has translated their Biosafety Guidelines into Lao. It is not clear whether all laboratories covered by CDC III have a set of Biosafety Guidelines in a language they can read.

38. The undergraduate training of medical laboratory staff in the School of Medical Technology is chronically under-resourced and the training facilities make it almost impossible to teach students Good Laboratory Practice. A new facility has almost been completed but there has been no input into the design of the laboratories in this new facility by anyone familiar with laboratory design or of biosafety requirements. The Lao resident WHO Laboratory Expert has been asked to investigate this as a matter of extreme urgency. The project should support the equipping of properly designed teaching laboratories with CDC-related equipment to improve the “work-readiness” of graduates. It also should support the purchase of minor items of equipment like micropipettes so **all** students are able to become competent in their use and maintenance.

39. Furthermore, the curriculum doesn’t appear to focus on developing competencies to diagnose the priority diseases in the Lao PDR. There would be value in providing support for the undergraduate training of Medical Laboratory Scientists.

40. In-service training in the workplace does not appear to be systematic and there is no follow-up to determine the success, or otherwise, of the training. Training does not routinely include a Quality component and most Scientists are unable to prepare a comprehensive Standard Operating Procedure (SOP) for activities they are performing on a routine basis. There would be value in developing a Continuing Professional Education policy/program for diagnostic laboratory staff.

41. Many Doctors at the Provincial and District levels have never heard of diseases like Leptospirosis, Brucellosis, many of the Neglected Tropical Diseases or many of the agents responsible for diarrheal diseases (i.e. food borne diseases). Furthermore, it is unclear whether they are adhering to formal case definitions when reporting diseases. Many non-metropolitan Doctors also lack the training to interpret the results of serological tests. There is an almost impenetrable divide between many Doctors and laboratory staff that hampers appropriate laboratory testing and reliable interpretation of data. Future communicable disease training workshops should include both laboratory staff and Doctors.

42. There would be value in the National Laboratory Consultant being a mid-career Scientist from within the Lao PDR laboratory system – several individuals might fill this role during the course of the project as a means of building residual capacity within the Cambodian diagnostic laboratory system beyond the current project.

e. Support services

43. Apart from within the regional laboratories and NCLE, there is little evidence of systematic laboratory management e.g. there may be a Biosafety committee but it may never meet.

44. While there is core funding for laboratories for items like salaries, the cost of tests are borne, principally by the patient. There is a large amount of unnecessary testing using automated equipment which may generate some easy revenue. Laboratory visits in CDC II identified the widespread use of out of date kits and even HIV tests which had been withdrawn from use elsewhere because they were unreliable. Staff explained it was necessary to do this in order to recoup their costs.

45. There is little systematic provision of supplies. This appears to occur only when provided by external funders.

V. Proposal

a. Overall priorities

46. The overall priority for this project is to assist MOH laboratories provide accurate diagnoses of selected communicable diseases, safely, in order to support regional surveillance for communicable diseases and to meet Lao PDR obligations under the International Health Regulations (IHR) and the Asia Pacific Strategy for Emerging Diseases (APSED).

b. Facilities and biosafety

47. The project should support the roll out of national biosafety guidelines – as hard copy in the first instance. The project should support the implementation of these guidelines with **on-site** training based on an audit of the facility by the National and International Consultants and the local staff against the national guidelines.

48. Facilities must be fit for purpose i.e. they must be weather proof, insect proof and have doors and windows that can be closed. Laboratories requiring cooling must have air conditioners rather than ceiling fans that create dangerous aerosols. Laboratory benches must be impervious to liquids so they can be disinfected. If procedures are likely to generate infectious aerosols, they must be performed in a class II Biohazard cabinet. There must be a hand basin near the exit for staff to wash hands. There must be access to a functional autoclave and there must be a formal plan for disposal of waste.

49. All laboratory staff should have access to personal protective equipment (closed shoes, laboratory gowns, disposable gloves, safety glasses) and the capacity to launder the gowns on-site.

c. Laboratory services

50. Project laboratories should be supported to diagnose a limited number of significant communicable diseases in their catchment area. The support will be a mix of equipment, reagents/test kits and training. For larger, central, laboratories where there is a significant volume of samples, anti-microbial resistance should be included in the mix of tests supported. At smaller laboratories, where the investment in bacteriological equipment cannot be justified because of the small number of samples, the focus might be on diseases like dengue and leptospirosis which can be diagnosed with point of care tests. One or two other tests, of local importance, could be added to this list.

51. The project should support the development of a national system for the referral of samples to regional and national reference laboratories. A number of other partners like US CDC and the Wellcome Trust have developed systems to support their projects. NCLE and/or WHO might attempt to co-ordinate these efforts.

52. It will not be possible to provide comprehensive laboratory testing, so a system of selective testing should be developed. The recommended model is to test, each month, a number of patients equivalent to 10% of the historical average of patients reported with that disease i.e. if the average number of dengue patients at that locality in September is 150, then

15 patients should be tested each September of the project. The project should provide the materials required to do this testing.

53. Many Doctors at the Provincial and District levels have never heard of diseases like Leptospirosis, Brucellosis, many of the Neglected Tropical Diseases or many of the agents responsible for diarrheal diseases (i.e. food borne diseases). They also lack the training to collect samples at the correct time and to interpret the results of serological tests. There is an almost impenetrable divide between many Doctors and laboratory staff that hampers appropriate laboratory testing and reliable interpretation of data. Future training Workshops should include both Doctors and Laboratory Scientists and they should continue to be competency based.

54. The undergraduate training of medical laboratory staff is chronically under-resourced and the training facilities make it almost impossible to teach students Good Laboratory Practice. Furthermore, the curriculum doesn't appear to focus on developing competencies to diagnose the priority diseases in the Lao PDR. In-service training in the workplace does not appear to be systematic and there is no follow-up to determine the success, or otherwise, of the training. The Laboratory Consultants employed for this project should assist the Medical Technology University to design and fit out the laboratories in their new buildings to an international level of biosafety. There would be value in providing key items of equipment and consumable items to support the undergraduate training of Medical Laboratory Scientists in topics related to this project and for the fit out of the new laboratories. The project should purchase, key, minor items of equipment that will be used to train undergraduates to diagnose communicable diseases related to this project. Priorities might be micropipettes and their disposable tips; a top loading balance to aid the calibration of the pipettes; 100 point of care tests to detect pregnancy and 100 to diagnose dengue.

d. Quality improvement

55. A priority for this project should be to continue and extend the process of preparing Standard Operating Procedures (SOPs) for all testing and processes covered by this project. The previous ADB CDC project began to address this issue by agreeing a standard format, with WHO and MOH, for SOPs in Lao PDR laboratories. Support for the preparation of SOPs for all aspects of laboratory activity should be continued. Production of SOPs is a critical first step in the national laboratory Quality improvement process.

56. NCLE should be introduced to the System for Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) and other project laboratories encouraged to engage with its processes.

57. A priority for this project should be to support the NCLE to confirm that it can undertake communicable disease laboratory testing at an internationally acceptable standard by participating in at least one new international EQA related to this project each year. NCLE also should attempt to co-ordinate and harmonize existing Quality programs and roll out external assurance programs nationally one test at a time. NCLE already participates in several international clinical chemistry EQAP.

58. Dengue point of care testing might be a suitable point to start a national EQA program. This could be approached in two ways (1) NCLE prepares a panel of 3-4 sera which it sends as coded samples to project labs for testing or (2) project laboratories send 2-3 positive and 2-3 negative samples to NCLE for confirmatory testing. As preparing panels of sera from patients

can be a challenge, option (2) is recommended. NCLE should be assisted by the National and International Consultants to develop a process of corrective actions for those laboratories that are unable to obtain the correct results.

59. There is a need to review the existing Quality Assurance Programs for TB, HIV and malaria to ensure that they are ensuring quality diagnoses and that necessary corrective actions are being taken.

e. Support services

60. MOH should recognize the management requirements of the laboratory subsector, being technically complex, and requiring up to 20 different functions to be in place to provide acceptable laboratory services. MOH may want to improve coordination mechanisms, and agree on level of services, guidelines, SOPs and other matters to arrive at a comprehensive system in line with the policy and strategic plan.

61. MOH needs to develop a sustainable solution for maintenance of laboratory facilities and equipment. Maintenance of other equipment may be combined in suitable packages and contracted out. Private maintenance firms are available in Thailand and Viet Nam. MOH also needs to improve new facilities for training of laboratory staff, if these do not meet biosafety requirements according to WHO. The lack of reagents and other supplies is a common reason for tests not being carried out, but many other laboratory functions are affected by periodic lack of funds, resulting in substandard services and biosafety hazards.

62. There is a major risk of procurement of substandard laboratory equipment, as specifications are often not good enough to avoid poor quality equipment. The National and International Consultants should support the procurement process by assisting in the preparation of specifications for all laboratory equipment and supplies.

VI. Implementation and Monitoring

a. Implementation

63. It is critical that the National and International Consultants establish contacts with WHO and other participants in the Laboratory sector in Laos PDR as soon as the project commences. There are a number of players in the communicable disease/diagnostic laboratory space resulting in overlapping and confusing messages for Lao PDR counterparts in the areas of Quality and Safety. Similarly, equipment maintenance and calibration can be simplified and coordinated within MOH and across projects if there is commonality between key items of equipment.

64. MOH should consider allowing the National Laboratory Consultant to be drawn from the ranks of mid-career scientists in its laboratories e.g. from the NCLE. This would have the advantage of retaining the skills gained working with an International Consultant within MOH at the conclusion of the project. Consecutive appointments could be made, each for 1-2 years and MOH would need to guarantee they could return to their original appointment, without loss of seniority, at the end of their contract.

65. There has not been the opportunity in the planning phase of this project to inspect each of the participating laboratories. Experience with previous ADB CDC projects suggests that third party inspections/audits of laboratories prior to commencement of the project have been unreliable and misleading and has resulted in the purchase of unwanted equipment or even

equipment that did not fit in the laboratory. At the commencement of the project, the National and International Consultants should visit each laboratory to identify any critical renovations that might be necessary to ensure safety, to confirm that all intended equipment is required, to assess existing Quality processes and staff competencies and to identify any other unforeseen obstacles. This is not a complex process and each laboratory visit could be completed in 3-4 hours.

66. The specifications for equipment and reagents should be prepared by the Procurement Specialist in consultation with the Laboratory Consultants and in the light of the laboratory inspections. Personal protection equipment should receive priority for procurement. Shoes can be purchased locally and laboratory gowns have been made locally in previous ADB CDC projects. Specifications for all diagnostic kits/tests should include criteria for sensitivity and specificity.

67. The number of diagnostic kits/reagents supplied to each laboratory must reflect the need and the ability of staff to perform the testing or to be able to be trained to do the testing. Criteria might include whether ALL suspected patients need to be tested or whether a sub-sample is sufficient. The "10%" proposal above might be considered and formal criteria prepared.

68. The specifications for class II biohazard cabinets must include on-site testing after delivery and installation to guarantee the integrity of the HEPA filters.

69. Training of staff should begin as soon as possible, address National and International policy and focus on core skills in support of Quality and Safety. Key elements of the training might be – internationally accepted case definitions for communicable diseases covered by this project, criteria for the diagnosis of a communicable disease, how to use and maintain a micropipette, preparation of Standard Operating Procedures, proper use of PPE, safe use of an autoclave, All training should have a significant bench based component (i.e. more than 50%), be assessed and include a component of competency based assessment. Workshops participants should include Doctors and Scientists until at least one Doctor from each site has completed training.

70. NCLE should be funded to participate in international communicable disease External Quality Assurance Programs for diseases relevant to this project, other than for TB, HIV and malaria.

71. NCLE should commence a quality Assurance Program in year 2 for one of the diagnostic tests being performed by all laboratories in the project. The simplest option would be for all laboratories to send three positive and three negative samples to NIPH for retesting on one occasion each year.

b. Monitoring

72. The National and International Consultants should visit each laboratory at least once each year to assess safety and quality processes against a pre-agreed check list. It is highly desirable that someone from NCLE participates in these visits and that this experience be used as preparation for a National Laboratory audit system. These annual visits should include an assessment of the effectiveness of the training of laboratory staff by the project e.g. have they prepared any SOPs; are pipettes and all other equipment clean and calibrated; are they using appropriate PPE; is there a clear trail from requests for testing to the recording and reporting of results; have all test results been reported to NCLE/MOH; and how did the lab perform in the

EQA organized by NCLE. These annual visits also will identify any problems with the supply of equipment and reagents and enable remedial action to be initiated. These visits also should confirm that the results of all tests performed with diagnostic kits/reagents provided by the project have been reported to the Central Epidemiology Unit in Vientiane.

VII. Conclusion

73. In line with the WHO regional strategy for strengthening laboratory services, MOH Lao PDR has a laboratory policy and strategic plan in place which also addresses laboratory requirements for IHR/APSED. MOH also has a work plan for IHR/APSED roll out. However, the implementation of the Plan is fragmented. With leadership in place at NCLE, there is weak coordination and fragmentation. Critical support of WHO is also unstable.

74. The NCLE is a BSL2+ Laboratory. While MOH is aspiring to have a BSL3 laboratory, the maintenance costs have been prohibitive, and MOH is relying on the Lao Pasteur Institute for such diagnostics. However, the Government does operate cultivation of dangerous viruses in the animal health laboratories, which is of public health concern given local conditions.

75. For MOH to have confidence in its communicable disease data and to be able to plan and evaluate responses to outbreaks, it requires a reliable diagnostic laboratory system staffed by appropriately trained staff working in facilities that are safe for staff and which pose no threat to the community.

76. However, the biosafety and diagnostic services in most provincial laboratories are not up to standard. Most laboratories do not have standard operating procedures (SOPs) for their activities and are experiencing shortages of essential supplies due to funding constraints. While staff is being trained regularly, the trainings are for the most part too short and theoretical. New facilities for pre-services training are reportedly also not up to standards. Apart from HIV, TB and malaria, there are no national quality assurance programs in the communicable disease areas covered by this project. A laboratory audit system is not yet in place although NCLE is keen to start this.

77. This project aims to help build the laboratory system for quality improvement, including planning, preparation of SOPs, and improvement in pre-service and in-service training and supplies. The project will also support 12 provincial laboratories and affiliated district hospitals to improve biosafety and selective diagnostic capacity, in a manner that is consistent, safe and accurate and to report the results in a timely manner; and using very simple, inexpensive and uncontroversial quality improvement processes.

78. There is a major risk of procurement of substandard laboratory equipment, as specifications are often not good enough to avoid poor quality equipment. The National and International Consultants should support the procurement process by assisting in the preparation of specifications for all laboratory equipment and supplies.

Appendix 1: Laboratory Summary Matrix
GMS Health Security: Laboratory Summary Assessment

A. GMS LABORATORY SERVICES SUMMARY				
Laboratory Services	Cambodia	Lao PDR	Myanmar	Viet Nam
1. National and Subnational Laboratories and Referral Abroad				
<i>Name of national laboratories</i>	National Institute of Public Health NIPH	National Centre for Laboratories and Epidemiology NCLE	National Health Laboratory NHL	National Institute of Hygiene and Epidemiology NIHE
<i>CDC/EID Function/Services</i>	Diagnostic tests up to BSL2+, quality control	BLS2+. Biological blood analysis, PCR (Elisa, vibro, cury-bacterian, Ecoli.) culture. Serology, Molecular, cell culture for influenza.	BSL2+, training, some research, quality control. Expanding range of pathology tests to improve surveillance	Diagnostic tests up to BSL3, vaccine production, training, research, quality control
<i>Key Issues</i>	Capacity for antibiotic sensitivity testing (AST)	Lacking of GoL budget support for reagent and supply	Major staff constraints, outdated facility and equipment	Lack of laboratory space
<i>Names of specialized CDC/EID hospitals with lab</i>	All major tertiary hospitals in Phnom Penh, Calmette hospital, Pasteur	5 centrals hospital: Mahosot, Friendship, Seta, 103, 5Mesa, MCH and Pediatric	National Hospital Yangon Regional Hospital Nay Pyi Taw, Regional Hospital Mandalay Department of Medical Research	Bach Mai Infectious Diseases Hospital, Hanoi, all major tertiary hospitals in Hanoi and HCMC
<i>CDC/EID Function/Services</i>	Disease control and patient care	Serology, biological blood analysis, PCR and UTI	Care of infectious patients, diagnoses	EIDs and other infectious diseases
<i>Key Issues</i>		Standard serology and biological no culture	Overlapping CDC roles, overlapping surveillance systems, low immunization quality needs surveillance	
<i>Names of other public CDC labs/research institutions</i>	NCHADS, NCTB, NCPEMC	CHASS, NCTBC, CNMEP	NPT/Mandalay laboratories NHAP, NTP, NMP	VAAC, NTBI, NIMPE, NIHE,

<i>CDC/EID Function/Services</i>	Linked to specific technical needs of the National Programs including Dengue, TB, malaria, HIV/AIDS programs	CPME – malaria, parasite intestinal and PCR TB – sputum and blood FDD – food borne disease and chemical product Dermatology Center	For TB/HIV/malaria programs	For TB/HIV/malaria programs
<i>Key Issues</i>	Coordination	Specialist lab for each purpose. costly than hospital	Roles need to be more clearly defined, reporting	Coordination and reporting
<i>Names of other institutes involved in EID/CDC</i>		Military lab for malaria at Phontong	Military (Tattmadaw)	Military
<i>Key Issues</i>			No coordination/reporting	
<i>Names of major research labs</i>	Institute Pasteur in Cambodia	Institute Pasteur Mérieux	Institute Pasteur is linked to NHL	NIHE, IP Nha Trang IP HCMC
<i>Function/Services</i>	Biomedical research and surveillance of infectious diseases, platform for comprehensive medical and biological analyses unique in Cambodia, international vaccination center	Completed serology test and research study		Biomedical research and surveillance of infectious diseases
<i>Key CDC/EID Issues</i>		Research purpose major		
<i>Global/Regional referral labs for the country</i>	France, USA, Japan, Australia	France, Denmark, England, New Zealand, Greece, USA, Japan	UK, France, Japan, Korea, USA	USA, France, Japan, Australia
<i>Function/Services</i>		IQA/ EQA		

2. Regional Laboratories				
<i>Names</i>		Luangphabang, Military 107, ODX, SVK and CPS	NPT, Mandalay	Pasteur Institutes in HCMC, Nha Trang, Central Highlands
<i>Function/Services</i>		biology and serology, some culture in for research study only	Referral laboratories	Infectious diseases control
<i>Key CDC/EID Issues</i>			Role in outbreak response not clear vis-à-vis NHL	
3. Provincial/State laboratories				
<i>Number</i>	25	17 provincial hospital lab	15	64
<i>Function/Services</i>	CPA guidelines: "provision of high quality service in medical analysis responsive to the need for diagnosis which are all necessarily pertinent to general medical and surgery services in a referral hospital"	biology and serology	Referral laboratories – general diagnostics including histology and microbiology.	General hospital laboratories for patient diagnostics Provincial medicine laboratories for infectious diseases control, food safety and screening for NCDs
<i>Key CDC/EID Issues</i>	Different capacities	Some provinces have army laboratory	New an appropriate equipment provided to state laboratories, however there is lack of capable staff and 2 state laboratories do not have a pathologist. Not clear who is responsible for laboratory services for outbreak response	High workload of provincial laboratories

4. District laboratories				
<i>Number</i>	92 referral hospitals with laboratory services based on the levels of CPA (1-3) with 1 is the lowest.	148 district laboratories	48 district hospitals	All district hospitals in 64 provinces
<i>Function/Services</i>	Id. To provincial lab	Biological and serological analysis	Hematology, parasitology, biochemistry, urine analysis	Hematology, parasitology, biochemistry, urine analysis
<i>Key CDC/EID Issues</i>	Different capacities	Basic analysis with para-biological machine		
5. Community/township laboratories				
<i>Types and Number</i>	N/A	768 HC lab with RDT & microscopic 4 Community lab.	324 Small lab, not including some labs in station hospitals	One-person lab
<i>Function/Services</i>	Sometimes rapid test for TB, HIV, malaria, dengue	basic analysis using para biological machine	Microscopy for malaria, TB, rapid test for malaria, TB, HIV if supplies available	Microscopy for malaria, TB, sometimes rapid test for HIV, dengue
<i>Key CDC/EID Issues</i>		Lacking of lab staff		No proper facility
6. Private laboratories				
<i>Types and Number</i>	In all urban locations and some rural locations, probably over 3,000	All 1,044 private clinic and 16 private hospital have their own lab	In major cities and towns	Over 10,000 private labs either in clinics or separate
<i>Function/Services</i>	Patient diagnostics	Lab for diagnostic	Patient care	Patient diagnostics, no public health reporting unless for notifiable diseases
<i>Key Public CDC/EID Issues</i>	No license, no inspection	Many private clinic got license from MoIC and under MoH	Reporting to health department	Insufficient inspection

7. Training institutions for laboratory staff				
Number of Universities		University of Health Science	University of Yangon and Mandalay	
<i>Course/duration/intake</i>		6 years	Bachelor of Medical Technology, 4 years, to be operated by MOE in 1 year	
<i>Key Issues</i>			Not enough skill training, Need to improve biosafety of teaching labs, and provide new equipment, test kits and micropipettes	
Number of Colleges		Faculty of Medical Technology		
<i>Course/duration/intake</i>		4 years course (bachelor) 3 years course (semi-bachelor) in SVK		
<i>Key Issues</i>		After MA they can continue study in Medical science technology		
Number of Schools	One Technical School for Medical Care (TSMC) in Phnom Penh	SVK, CPS and LPB	Laboratory technician operated by MOH	
<i>Course/duration/intake</i>	3 years	1,6 years course	1 year	
<i>Key Issues</i>			Insufficient training to work independently in field lab	
8. Blood banks				
<i>Key Issues relating to EID</i>	To define clear linkage with EID (e.g. antimicrobial resistance, infection prevention and	National Lao Blood banks under Lao Red Cross scan for HIV, Malaria and STD		

	control)			
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B. GMS LABORATORY SYSTEMS SUMMARY				
System features and performance	Cambodia	Lao PDR	Myanmar	Viet Nam
Strategic Element 1: Developing an operating framework for improving laboratory services				
1. Legal Framework				
<i>Laboratory services policy/strategy for CDC/EID in place?</i>	Yes	Yes	Draft Laboratory Plan	Yes
<i>Legal frameworks for laboratory services quality and biosafety?</i>	Yes	Operational Guideline for Health Lab Network in Laos	No biosafety legislation	Yes
<i>Legal framework for private laboratory services for CDC/EID?</i>	In process	Yes, but could not control	No	Yes
<i>Legal framework for laboratory accreditation and audit?</i>	In process, for 25 sites for national and provincial levels	Yes	No	Yes
<i>Other major legal frameworks of relevance to CDC/EID labs?</i>	Relevance for CDC laws	National strategy CDC lab No. 165 in 2014		
2. Organization				
<i>List MOH Departments managing laboratory services?</i>	Department of Medical Services (Bureau of Medical Laboratory Services)	DHS, HCD, FDD, CDC and Training Dept.	Department of Hospital Services	General Department of Preventive Medicines, Viet Nam Administration of Medical Services
<i>Is there one MOH department overall in charge of lab services?</i>	Yes	No	No	No
<i>Are laboratory services headed by DG or DDG?</i>	No	No	No	No
<i>Is there an active and effective planning</i>	Annual Operational Plan (AOP) development	AOP	AOP	AOP

<i>structure?</i>				
<i>Is there an active and effective national coordinating committee?</i>	Yes (Sub-technical Working Group on Blood Safety and Laboratory Services: SWGBSLS))	Yes, Dr Phengta Vongphachanh	Yes	Yes
<i>Is there an active and effective technical workgroup/taskforce?</i>	SWGBSLS	Yes, including 16 members	Yes	Yes
<i>Other issues?</i>		Twice meeting a year		
3. Planning, Management, Monitoring				
<i>Is there a comprehensive laboratory development program?</i>	Yes, through the Nat Strategy for Medical Laboratory Services 2015-2020	Yes		Separate for GDPM but now being integrated
<i>Is a laboratory five year plan and budget approved?</i>	No costed plan	Yes		Separate plans
<i>Are laboratory services financed through annual plans?</i>	Yes	No, sometime get sometime no	Yes	Yes
<i>Are lab management /SOPs in place?</i>	Yes	Yes		
<i>Is the laboratory management information system functioning?</i>	Early stage of development, need more logistic support	Not effect to all		
<i>Is there a functioning central lab database system?</i>	To be finalized by the end of 2015	Some time and rarely updated		
<i>Is there monthly reporting to the national oversight agency?</i>	Yes	Yes		
<i>Is action taken based on reported performance of laboratories?</i>	Yes, partially	Some time		
<i>Other issues?</i>				

4. Financing				
<i>Is the annual laboratory budget received in time and sufficient?</i>	Not sufficient	Not on time and not sufficient	Cash flow problems	
<i>If not, what is typically being cut/skipped?</i>	Biosafety, Lab information system, maintenance	Always reagent and equipment	Supplies	Supplies
<i>What % of laboratory budget allocations can be spent annually?</i>	Around 14% in 2015	80%		
<i>What % of the non-salary recurrent budget for laboratory services is financed (i) by government, (ii) by donors, (iii) out of pocket?</i>	Donor support usually in kind, through trainings	23% government 39% donor 38% Out of pocket and other		
<i>Who decides how to spend laboratory allocations?</i>	MOH Management (Minister)	Steering committee	Director	Head of Laboratory
<i>Are sources used in a balanced manner and used efficiently?</i>	Rationalized through the Sub-technical working group on blood safety and laboratory services	No	Yes	Yes
<i>Other issues?</i>				
Strategic Element 2: Reforming and integrating laboratory services				
1. Leadership				
<i>Is there proof of strong leadership and commitment to evidence based decision making including better use of laboratory services?</i>	Yes, National Strategy for Medical Laboratory Services 2015-2020	They said Yes	Yes	Not sure
<i>Is there strong advocacy of senior management on importance of improving quality and biosafety of</i>	Yes	Not sure	Yes	Yes

<i>lab services?</i>				
<i>Is government committed to sustain laboratory financing?</i>	Yes	No	Yes	Yes
<i>Is government considering contracting out to the private sector?</i>	No	No	No	No
<i>Other issues?</i>	Budget constraint			
2. Strategic Planning				
<i>Is there clear guidance on standards of laboratory services?</i>	yes	Yes	Some	Yes
<i>Are standards based on burden of diseases and expected demand?</i>	Yes, geared towards IHR/APSED	yes	No	Yes
<i>Which laboratories are often seriously underused?</i>	Need more training for improved use by clinicians	Don't have yet	Small laboratories	District Preventive health center laboratories
<i>What mainly explains low demand for lab services, low public demand, private sector competition, limited range of diagnostics, lack of staff, poor quality, limited opening hours?</i>	Lab services underused by clinicians	Limited range of diagnostics, lack of staff and limited opening hours	Lack of staff an supply	Low demand for services
<i>Are there mechanisms to rationalize laboratory services?</i>	Yes, through QMS, QA, Biosafety, SOP standards	Yes	Not yet	Plan to integrate district preventive and hospital laboratories
<i>Are there plans to adjust laboratory services to make these more effective and efficient?</i>	Training based on real life situation when an unknown health event occurs → rapid response team, lab, infection control and clinicians working together)	In 5 year plan (2016-20) has several point for improving their services	Build capacity of NPT and Mandalay laboratories to reduce work of NHL	As above

<i>Other issues?</i>				
3. Coordination				
<i>Are roles of various national laboratories clear?</i>	Yes (TORs)	Yes	No	Yes
<i>Are roles clear between levels of laboratory services?</i>	Yes (CPA guidelines)	Yes	No	Yes
<i>Is a specimen referral system in place?</i>	Yes, as specified in Quality Manual	Yes	Weak	Yes
<i>Are there formal links with clinical services?</i>	Yes, in lab with QMS	Yes	Yes	Yes
<i>Is there a regional/global referral for difficult diagnostics?</i>	Yes through IATA, ICAO	Yes	Yes	Yes
<i>Is there a move towards (de)centralized laboratory services?</i>	CPA guidelines: Lab only available at district level	Yes	Yes	No, need to centralize to make more efficient
<i>Are there efforts for horizontal integration of laboratory services – curative and preventive?</i>	Yes, through CAMLIS	Yes, system in place not sufficient fund support	Being discussed	Yes, as above
<i>Is there a move towards integration with the private sector/contracting out?</i>	No	No	No	No
<i>Are there formal links with other laboratories such as for animal health, water quality and food product inspection?</i>	Yes, especially with the Ministry of Agriculture (NaVRI)	Yes Quarterly meeting	?	Yes
<i>Has mapping of stakeholders of lab services been done?</i>	Yes, by the MOH Bureau of Medical Laboratory Services (BMLS)	yes	No	No
<i>Is there effort to improve</i>	Yes	In process with	No	No

<i>networking at local, national, regional and international levels for sharing experience and resources?</i>		international, regularly with local, national and regional		
<i>Is there a coordinating body to create collaboration among partners at local, national, regional and international levels?</i>	Yes, through the Sub-technical working group for blood safety and laboratory services	Yes	No	No
<i>Are GMS countries supporting each other for EID diagnostics</i>	Yes	Yes	Yes	Yes
<i>Other issues?</i>				
4. Evaluation				
<i>Latest comprehensive Lab assessments?</i>	2013- 2014- 2015	5 provinces under EU 2013, 12 provinces under ADB in 2014		
<i>Latest national lab review?</i>	2015 (Nat Strategy 2010-2015→2015-2020)	July 2014		
<i>Is annual plan assessed each year?</i>	Yes, every January	Yes	?	?
<i>Are regular internal laboratory discussions required?</i>	Yes, through sub-technical working groups at all sites with microbiology	Yes	?	?
<i>Are regular laboratory discussions with clinicians required?</i>	Yes	Yes	?	?
<i>Are special studies done like fever study, immunization study to assess effectiveness of disease control programs?</i>	Yes, Fever study with NAMRU	Yes	Proposed	Proposed
<i>Is information used</i>	Yes, Cambodia Laboratory	Yes	No	No

<i>efficiently to improve lab services?</i>	information system (CAMLIS) under development to support CAMEWARN and anti-microbial resistance (AMR) effort			
<i>Are there periodic evaluations to measure the degree to which individual laboratories have implemented recommended changes?</i>	Yes, but irregular	Yes, by WHO technician support in NCLE	WHO	WHO
<i>Other issues?</i>	Budget constraint, not enough supervision		Budget constraint	
Strategic Element 3: Improving Biosafety of Laboratories				
<i>Are Biosafety SOPs available?</i>	yes	Yes	No	Yes
<i>Is there regular assessment of all aspects of biosafety?</i>	First assessment in 2015	One a year	No	Yes
<i>Do facilities use biosafety score cards and plan for improvement?</i>	Yes	Yes	No, new hospitals are not compliant with international biosafety standards and need modifications	Yes
<i>List any major biosafety system problems?</i>	No standard BSC, no financial resource for decontamination		Lack of funds, lack of biosafety guideline	
<i>Does every lab has an appointed biosafety person?</i>	Yes, for national referral lab & sites with microbiology	Yes	Yes	Yes
<i>Are in charges of laboratories specially trained in biosafety?</i>	yes	Yes	Yes	Yes

<i>Is there a national training program for biosafety?</i>	No formal curriculum, only short courses ToT from Singapore TA for curriculum development needed	Yes	No	Yes
<i>What proportion of staff is trained/qualifies in biosafety?</i>	All lab staffs at sites with microbiology	100%at national level		All in charges
<i>Are there national standards for design of lab facilities for biosafety including for liquid and solid waste management?</i>	yes	Yes	WHO standards	Yes
<i>What are the main facility problems for biosafety in provincial and district laboratories such as lack of space, facility design, waste management, etc?</i>	No standard	In some province no space for waste management and many district depend on facility design	Outdated facilities, not using protective clothing, improper handling of waste by untrained persons	Waste management
<i>Are there national standards for biosafety equipment of laboratories?</i>	No, TA needed	yes	No	Yes
<i>What are the main equipment shortages for biosafety in labs?</i>	Backup electricity, BSC spare parts	Drainage waste water use the same main drainage	Incinerators	Waste management equipment
<i>Which consumables are mostly out of stock for biosafety?</i>	Not sufficient	Coach, shoe and hand washing liquid	Basic cleaning supplies	Detergents, gloves, brushes, etc.
<i>Other issues?</i>	No budget to certify, not enough training and supervision			
Strategic Element 4: Improving Quality of Laboratory Services				
<i>What hard data are available on lab quality</i>	IQC needed to get data on lab quality			

<i>problems?</i>				
<i>What are the common problems in quality of lab services?</i>	Levy Jennings Charts	Lack of reagent at national level and at provincial and district lack of clean water supply	Lack of calibration, staff skills, supplies, lack of minor equipment	Staff skills
<i>How does MOH show commitment to address these problems?</i>	Refresher trainings, labs to record data and take corrective actions	Some problems were solved and some could not yet		
<i>Are quality objectives clearly defined and documented?</i>	Yes, in CPA guidelines	Not all were recorded	No	Yes
<i>Is the lab QI design clear and understood within MOH?</i>	Yes, as stated in the national strategic plan 2015-2020	Yes		Not sure
<i>For which levels is a quality improvement plan being rolled out?</i>	National referral labs & CPA3+microbiology labs	Central and provinces	Central	Provinces
<i>Are protocols and SOPs available for IQC?</i>	Yes	Yes	no	Yes
<i>Are protocols and SOPs for IQC available on line?</i>	Not yet, to be synchronized to become standard	No	no	
<i>What % of labs has satisfactory IQC > 50%, 80% in 2014?</i>	2015: 44% for biochemistry 61% for hematology	80%		
<i>What are the major issues in implementing IQC?</i>	Trainings, support reagents	Long time of transport specimen		
<i>What % of labs were examined in external quality assurance?</i>	31 out of 89 labs (34%)	5%	HIV QA done, but not available in visited labs NHL does periodic QA	
<i>What % of examined labs has satisfactory EQA > 50%, 80%?</i>	2014: Bacterio: 100% Serology: 100% Hemato: 49% Biochemistry: 74%	85%		
<i>What are the major</i>	Refresher trainings; follow	High cost of transport		

<i>issues in implementing EQA?</i>	up	and fee		
<i>What % of labs are ISO certified at what level</i>	Not yet	90% WHO		NIHE: nil Provincial level: 25%
<i>Is there a laboratory audit system in place up to what level</i>	Internal: working group External: not yet available	Yes for basic	No audit system in place	No
<i>Is laboratory registration and accreditation required for public and private laboratory services</i>	Yes	Yes in rule not all practices	Yes	Yes but not in practice
<i>Is there a registration and accreditation agency</i>	MOH Department of Hospital Services (mostly registration)	Yes	Department of Hospital Services	VAMS
<i>What % of private laboratories are registered and accredited?</i>		25%		
<i>Other issues?</i>	Improve private sector, QMS, Bio-safety			

Strategic Element 5: Improving Laboratory Resources

1. Staff

<i>Is there an approved HRD plan for laboratory services?</i>	Yes. The national Examination. For 2015, a total of 1,030 lab technicians trained. MOH intake:18 among all the 433 staffs approved by the Government	Yes	No	Yes
<i>Is there a personnel management system for lab staff?</i>	Yes	Yes	No	Part of general system
<i>What are the major documented issues in HRD in laboratory</i>	Lack of staff at lower level	lack of staff at lower level, lack of lab managers, low pay,	Lack of qualified staff at lower level	Staff constraints at lower level

<i>services, e.g., lack of lab managers, lack of staff at lower level, shortage of specific cadres, staff drain to private sector, staff motivation, lack of career opportunity, low pay, staff quality?</i>		staff quality		
What are MOH priorities to be addressed?	Staff quality/quantity as per CPA guidelines (CPA1: 3; CPA2:3-5; CPA3: 6-8)	Improve staff quality at low level	Staff quality	Staff quality
<i>Other issues?</i>				
2. Pre-service Education				
<i>Is there coordination with MOE on standard curriculums?</i>	Yes, for curriculum update	Yes but school is under MOH	Yes, higher level training done by MOE, lower level by MOH	
<i>How many students enter lab studies annually all levels?</i>	2015: 18 lab staffs/MOH total 433)	70 to 100		
<i>Do students have sufficient basic science preparation?</i>	Insufficient	Insufficient	Insufficient	Insufficient
<i>Are there major shortages of staff, facilities, equipment, supplies?</i>	Yes	shortages of facilities, equipment, supplies	Yes	No
<i>Are exams serious and rigorous?</i>	No, support by JICA, US CDC, but not strict	Not all, some	Yes	Yes
<i>Are government positions available after graduation?</i>	18/433 (2015)	Not all student, many position available in province and district; student not prefer to go far from home	Yes	Yes
<i>Are schools certified and inspected annually?</i>	Yes, but irregular	Yes	No	No
<i>Other issues?</i>				

3. In-service Training				
<i>Is in-service training ad hoc driven or follows agreed annual plan?</i>	both	Some		
<i>Average staff training per year as % of total staff?</i>	In 2013-2014: 120 lab staff trained in bio-safety; 2015: 15 staff each trained on hemato & bio-chemistry (July 2015: MOH staff=20,811 with 491 secondary lab staff and 72 primary lab staff)	3%		
<i>Mostly class room or practical training?</i>	both	Yes		
<i>What % of labs have NGO partnership or mentoring?</i>	Specific to NGO area of support	30%		
<i>Are there on-line training programs?</i>	no	No		
<i>Other issues?</i>		At NCLE has on job train by WHO lab technical staff other lab no		
4. Equipment				
<i>Is there a standard essential equipment for each level?</i>		Yes	Yes	
<i>What are common equipment items lacking in many laboratories?</i>		Central level not many thing In province still have	Most items available	
<i>What are common reasons for low use of equipment?</i>		Not existing of how often used Check for using purpose	Lack of skilled staff	
<i>Are purchased</i>		Yes, often	No, purchased	

<i>equipments often of substandard quality?</i>			equipment is appropriate	
<i>How can the procurement of quality equipment be assured?</i>		Procurement based on specification	Maintain technical selection committee	
<i>Is there a system for equipment maintenance and calibration?</i>		Yes	Centralized, needs training of staff to do their own calibration	Yes, maintenance contracted out for some equipment, and team goes round to calibrate biosafety cabinets
<i>Is equipment being leased?</i>	No	No, not leased	No	No
<i>Are there qualified staff trained in preventive maintenance?</i>		Based on SOPs after trained	Yes but few	
<i>Are there SOPs for maintenance and calibration?</i>		Yes	Yes but not widely used	
<i>Other issues?</i>				
5. Supplies				
<i>Is there a standard list of supplies for various levels of labs?</i>	Yes (standard tests for each CPA level)	Yes, for EU project and some ADB	Yes	
<i>Which are the major stock outs for laboratory services – reagents, glassware, PPE, rapid tests?</i>	Mostly reagents to run IQC tests	Some stock out of PPE in province, NCLE stock out of some reagents		
<i>Is there a national stock keeping system for lab supplies?</i>	Yes, at Central Medical Store	No		
<i>Are lab supplies purchased directly from the private sector?</i>	Centrally procured if from MOH, direct purchase if from HEF	Depend on project procurement		
<i>Are lab supplies mainly paid from patient fees?</i>	About 70% covered by MOH	No		

Are supplies properly stored?	Yes	Yes		
How are supplies disposed of if out of date?	N/A: Supplies are to be used before expiry date	Specimen for training		
% need covered for rapid tests for malaria, HIV, TB, and dengue?	Dengue: 100 tests/year	90%		
Are particular tests missing?	Dengue	Provincial level assessment needs		
Other issues?				
6. Technical assistance				
Agencies providing major funding	WHO, DMDP (Developing Microbiology Diagnostic Program), Mérieux Foundation, USCD, NAMRU2	ADB, EU, WHO, CDC(USAID)		
Agencies providing technical support	WHO, DMDP, TLL (Temasek Life science Laboratory), AFRIMS	EU, ADB, WHO, CDC(USAID) NIED(Japan)		
Are there NGOs/INGOs/experts providing mentoring	US CDC, ITECH, DMDP,	5 TA		
Are lab staffs regularly engaged in technical associations, networks, community of practice?	Newly created Lab Association (Chair: Pharm. Ket Vansith)	Yes		
Are lab staffs regularly exposed to workshops, formal meetings, professional discussions, web sites?	Yes	Yes		
Other issues?	Coordination/synchronization			

C. GMS PUBLIC LABORATORY ASSESSMENT SUMMARY				
Equipment and Supplies	Cambodia	Lao PDR	Myanmar	Viet Nam
National/Regional Public Health Laboratories (add any other major lab if this is a MOH priority)				
<i>List major items of equipment not available, not functioning, or old.</i>		Inventory list a NCLE Provincial level some existed list		
<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Zika virus		
<i>List gaps in staffing.</i>				
<i>List safety equipment (e.g. washing machine, autoclave, PPE, not available, not operational or old.</i>		NCLE- autoclave Province- autoclave needs for more purpose use at least two per each lab		
<i>List safety supplies in short supply incl PPE, gowns.</i>				
Regional/State, Provincial, and District Laboratories, (select questions as applicable, sample range of facilities)				
1. Biosafety				
<i>Is lab space adequate?</i>		not for biosafety		
<i>Can all doors and windows be closed?</i>		Some new hospital could closed, not for old hospital		
<i>Is Laboratory air conditioned?</i>		Yes, some		
<i>Are PPE, lab shoes, cabinets and wash-up</i>		Not all lab in provincial hospital		

<i>available at entrance?</i>				
<i>Is laboratory clean (e.g., benches, corners, alcoves for storage)?</i>		Some laboratory at provincial hospital		
<i>Is equipment clean (e.g., micropipettes, fridge)</i>		Yes		
<i>List biosafety equipment (e.g. autoclave, personal protective equipment) not available, not operational, or old?</i>		Yes existing for 5 provinces of EU project in attached file		
<i>List shortages of biosafety disposables?</i>		No		
<i>Is there a functioning system of liquid waste management</i>		Yes		
<i>Is there a functioning system of solid waste management?</i>		Yes		
<i>Is solid waste first autoclaved?</i>		NCLE yes, Some 5 provinces only		
<i>Is solid waste burned?</i>		Some burned some throw with public waste		
<i>Is incinerator working and up to standard</i>		Some province of EU project and some of big province (LPB, VT province)		
<i>Is solid waste dumped in compound or where?</i>		In compound dumped		
<i>When was last staff training for biosafety?</i>		May 2015 in 5 provinces only, March to May 2015		

		for all		
<i>Who is in charge of biosafety?</i>		Dr Noi Kaseumsy Biosafety officer in each province		
<i>List any other problem in biosafety.</i>		Municipality waste dumped in compound is not aware of biosafety in town No, existing biosafety law for legacy safety to population(lawyer for drafting) No quality of biosafety standard in each health facilities		
2. Range of Laboratory services				
<i>Is there a plan for lab development?</i>		Yes		
<i>List gaps in staffing.</i>		Will support list later		
<i>List critical diagnostic assays not available.</i>		Zika		
<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Will support list later		
<i>List major items of equipment not available, not functioning, or old.</i>		Autoclave not enough because two are broken		
<i>List lack of supportive equipment like fridges, transport box, stools.</i>		Will support list later, almost complete items for all province		

<i>List lack of testing supplies including reagents, rapid tests, disposable labware.</i>		Will support list later		
<i>How many tests per month total?</i>		800 tests per month		
<i>List top five diagnostics.</i>		Influenza, Dengue, Stool culture, Gen.pack culture and measles		
<i>How many referrals per month?</i>		NCLE, some		
<i>Referrals for what?</i>		For quality assurance		
3. Quality of Laboratory services				
<i>List gaps in in-service training for all staff.</i>		On the job train on quality 6 provinces (EU+KM) on quality assurance		
<i>List gaps in quality improvement program.</i>		NCLE- drafting standard of quality improvement program		
<i>List gaps in SOPs.</i>		Yes , existing		
<i>List gaps in equipment manuals.</i>		Yes, not completed		
<i>When micropipettes were calibrated last?</i>		More than one year		
<i>Maintenance and calibration records available for equipment?</i>		No, just small supported from EU		
<i>List problems in calibrating equipment.</i>		NO		
<i>List problems in maintaining equipment.</i>		Yes		
<i>List gaps in quality assurance program.</i>		NO		

<i>Is most equipment available?</i>		Some		
<i>Are many equipments due for replacement?</i>		Several equipment need replacement		
<i>Who maintains, contracting out?</i>		No		
<i>Leased equipment?</i>		Not available		
<i>Is there a budget for maintenance?</i>		NO		
<i>Is laboratory i/c monitoring lab performance?</i>		No		
<i>Any other issues?</i>				
4. Laboratory Management				
<i>Level and years of experience of Lab in charge?</i>		1998 as EPI and lab		
<i>Is there an annual lab plan and budget?</i>		Yes		
<i>Are SOPs available for Lab management?</i>		No		
<i>Is there record of Lab management meetings?</i>		Weekly meeting (minutes)		
<i>Is there a system of Lab staff supervision?</i>		Yes		
<i>Is computer and internet available?</i>		Yes		
<i>Are monthly reports submitted as required?</i>		Yes		
<i>What proportion of lab services is financed by government, partners and out of pocket?</i>		23% government 39% donor 38% Out of pocket and other		
<i>List gaps in financing.</i>				

<i>Has the lab been certified/accredited?</i>		National influenza center, National Meals center and JE(WHO)		
<i>Has the lab been audited?</i>		Yes, on program based		
Community laboratories				
<i>Type of available staff?</i>		Yes, 3 staff each District		
<i>Cleanliness?</i>		Not up to standard		
<i>Lab gowns available?</i>		Yes		
<i>Microscope working?</i>		Yes		
<i>Microscopy supplies incl reagents and collection supplies?</i>		yes		
<i>Power stabilizers and battery?</i>		No		
<i>Malaria rapid test?</i>		No		
<i>Dengue rapid test?</i>		No		
<i>Transport box?</i>		EPI box		
<i>Other tests?</i>		Paraclinic blood test		
<i>How many tests per months total?</i>		?		
<i>How many referrals?</i>		?		
Technical Schools				
<i>Benches and stools?</i>	Not enough	Yes	Yes	Yes
<i>AV equipment?</i>	Yes	Yes	Yes	Yes
<i>Computers?</i>	Not enough	Yes	Not enough	Yes
<i>Teaching microscopes?</i>	Not enough	Not enough	Not enough	Not enough
<i>Microscopes?</i>	Yes	Yes	Yes	Yes
<i>Weighing scale??</i>	Yes	Yes	Yes	Yes
<i>Centrifuge?</i>	Yes	Yes	Yes	Yes
<i>Water bath?</i>	Yes	Yes	Yes	Yes
<i>Hematocrit reader?</i>	Yes	no	Yes	Yes
<i>Micropipettes?</i>	Not enough	Not enough	Not enough	Not enough

<i>Reagents?</i>	Not enough	Not enough	Not enough	Not enough
<i>Rapid tests?</i>	Not enough	No	Not enough	Not enough
<i>PPE?</i>	Not enough/old	No	Old	Yes
<i>Biosafety teaching material?</i>	Yes	Yes	Yes	Yes
<i>Laboratory manual?</i>	Yes	Yes	Yes	Yes
<i>Laboratory SOP?</i>	Few	Few	Some	Most

Project number: 48118-REG

**R-PPTA 8842: THE GREATER MEKONG
SUBREGION HEALTH SECURITY PROJECT**

2016

TABLE OF CONTENT

Acronyms	1
Executive Summary	2
I. Introduction	4
a. Assignment	4
II. Major public health problems	5
a. Epidemiology	5
b. Demand for laboratory services	6
III. Organization, Policies and Plans	6
a. Organization.....	6
b. Policies and Plans.....	7
c. Progress.....	7
IV. Situation Analysis.....	8
a. Overall Assessment	8
b. Facilities and Biosafety	8
c. Laboratory services.....	9
d. Quality improvement	9
e. Support services	10
V. Proposal.....	11
a. Overall priorities	11
b. Facilities and biosafety.....	11
c. Laboratory services.....	11
d. Quality improvement	11
e. Support services	12
VI. Implementation and Monitoring.....	13
a. Implementation	13
b. Monitoring	13
VII. Conclusion	13
Appendix 1: Laboratory Summary Matrix.....	14

Acronyms

ADB	—	Asian Development Bank
AIDS	—	acquired immunodeficiency syndrome
APSED	—	Asia Pacific Strategy for Emerging Diseases
AST	—	antibiotic sensitivity testing
BSL	—	biosafety level
CDC	—	communicable diseases control
CLMV	—	Cambodia, Lao PDR, Myanmar, Viet Nam
DMR	—	Department of Medical Research
DMS	—	Department of Medical Services
DPH	—	Departments of Public Health
EID	—	emerging infectious diseases
GMS	—	Greater Mekong Subregion
HIV	—	human immunodeficiency virus
IHR	—	International Health Regulations
MEV	—	migrants and mobile people, ethnic minorities, and other vulnerable groups
MOH	—	Ministry of Health
MSc	—	Master of science
NGO	—	non-governmental organization
NHL	—	National Health Laboratory
NIHE	—	National Institute of Hygiene and Epidemiology
PhD	—	Philosophiae Doctor (doctor of philosophy)
SARS	—	severe acute respiratory syndrome
SOP	—	standard operating procedure
TB	—	tuberculosis
WHO	—	World Health Organization

Executive Summary

This report summarizes the assessment of laboratory services for the Greater Mekong Subregion (GMS) Health Security Project (the Project) of Cambodia, Lao PDR, Myanmar, and Viet Nam. It was prepared by the international laboratory quality improvement specialist and team members as part of the project preparation of the Asian Development Bank (ADB).

The Project will help strengthen national health security systems and GMS cooperation for the prevention and control of EIDs and other diseases of regional importance. The project will focus on regional cooperation and disease control in border areas, strengthening disease surveillance and outbreak response, and improving laboratory services and infection control in hospitals. Total project costs in Myanmar for 2017 to 2012 are estimated at \$12.6 million. The Ministry of Health (MOH) is the executing agency and will establish a project implementation unit (PMU). The Departments of Public Health (DPH) and the Department of Medical Services (DMS), including the National Health Laboratory (NHL) will lead the implementation in 5 states and one region.

Myanmar, with a population of 52 million in 2015, has emerged from a long period of stagnation. The country had several outbreaks of emerging infectious diseases (EIDs), and has a large burden of tuberculosis, malaria, and dengue, and a concentrated HIV epidemic. Common communicable diseases remain the major burden among children and the poor. Drug resistance is an emerging public health problem. All these constitute major public health and economic risks.

Myanmar is committed to implement the international health regulations (IHR) and the Asia Pacific Strategy for Emerging Diseases (APSED), and implement regional strategies for the control of major diseases such as dengue, malaria, tuberculosis and HIV/AIDS. Based on the WHO regional plan for strengthening laboratory services, MOH has developed a draft national laboratory plan likely to be approved in 2016.

A basic network of health services is in place in the more populated and accessible areas. However, a large share of Myanmar's population, in particular those living in isolated highlands including many of the poor and isolated ethnic groups, do not access formal health services. Hence there are gaps in diagnostics for surveillance, prevention, control, and management of infectious diseases, in particular in border areas.

Under leadership of the National Health Laboratory (NHL), MOH is upgrading its nation-wide network of public laboratory services that will also support surveillance for infectious diseases, starting with state/regional hospitals. With additional funding, MOH has been able to provide most of the equipment for laboratories in state and regional hospitals. The capacity for HIV, tuberculosis and malaria testing is already well advanced down to the township or station hospital, but screening capacity is still insufficient.

Major constraints to improve quality of services are serious staff constraints, both in numbers and in capabilities, lack of supplies due to recurrent budget constraints, biosafety issues of facilities, and lack of guidelines and SOPs for laboratory quality and biosafety. While NHL has a strong core team, it is overburdened with work and will need additional staff and technical assistance to play a meaningful role in rolling out laboratory quality improvement, assurance and audit.

Within the overall project scope, the Project will support laboratory system development for improvement of laboratory quality and biosafety, including support for pre-and in-service training and supplies rather than a major focus on procurement of major equipment. Technical assistance will be required given current staff constraints at NHL.

I. Introduction

a. Assignment

1. To identify priorities and progress and address gaps in laboratory services to maximize project benefits, a laboratory services review was carried in 4 countries by one international consultant and team members. This included (i) a general subsector review to identify priorities, and (ii) a specific assessment of equipment and other investment needs in targeted states/region to identify specific investment needs, and (iii) identification of implementation and monitoring arrangements, risks, and mitigation. This report identifies laboratory services challenges and plans, a summary of progress and issues in various laboratory functions, and project laboratory investment, implementation and risk mitigation proposals. The sector summary matrix is attached to the CLMV laboratory reports. Equipment details are in the procurement plans.

b. Project Summary

2. Under the GMS economic development program, ADB has been supporting various health projects for communicable diseases control (CDC), HIV, Malaria, and related regional technical assistance.¹ The Governments of Viet Nam, Cambodia, Lao PDR, and Myanmar and ADB have prepared the Project to strengthen national health security systems and regional cooperation for the prevention and control of EIDs and other diseases of regional importance in the GMS, and help countries to comply with IHR 2005 and implement APSED of the WHO.²

3. The proposed project goal is strengthened GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities, (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year, and (iii) increased use of public health services in border areas by MEVs. The proposed project outcomes are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed project outputs are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed project targets 5 states and one region along the borders and economic corridors with China, Lao and Thailand.

4. MOH has made progress with regional information sharing and cross-border cooperation for CDC. However, this needs to be mainstreamed and formalized. In addition, some groups of MEVs that are more likely to get and spread infectious diseases are not using regular health services. Under the first output, the Project (i) supports regional, cross-border, and inter-sectoral information sharing and coordination of outbreak control among GMS countries, (ii) develops regional disease control strategies and evidence-based CDC, and (iii) improves CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for joint planning and monitoring; and outreach and community mobilization to reach and engage MEVs.

5. MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis is strong. However, the system needs to be further

¹ Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

² World Health Organization. Asia Pacific Strategy for Emerging Diseases. 2010.

computerized and extended to communities by employing syndromic reporting. Linkages or integration among surveillance systems will also be improved. MOH also needs to improve capacity for disease outbreak response. Under the second output, the Project supports (i) syndromic reporting at community level, (ii) web-based reporting including information technology support, (iii) integration of surveillance systems, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport, and (vi) improving screening and quarantine capacity at border posts of entry and international quarantine centers. Support is needed for system design, computers, training, and vehicles and equipment for outbreak control.

6. District facilities are unable to comply with internationally acceptable levels of biosafety or to guarantee the accuracy of their laboratory testing.. Underlying problems are substandard training of laboratory staff, lack of quality control, and insufficient facilities, equipment, and supplies. The quality assurance system is in a nascent stage, and there is no national laboratory audit system. Nosocomial or hospital-acquired infections are becoming a major public health problem. Under the third output, the Project supports (i) improving quality assurance, (iii) in-service training, (iv) improving district laboratory services, and (iv) equipment and training for infection control and case management of dangerous diseases.

7. In Myanmar, the Project is estimated to cost \$14.9 million including \$14.5 million loan from ADB. MOH is the Executing Agency, through the Departments of Public Health and Medical Services. Implementing Agencies are the National Health Laboratory, and one regional and 5 state health offices along the eastern border of Myanmar (Shan North, Shan East, Kayin, Kayah, Mon, and Tanitharyi). The Project will be implemented over a period of 5-year period beginning early 2017. The project completion date is 30 June 2022.

II. Major public health problems

a. Epidemiology

8. Globally, all countries are at risk of outbreaks of emerging infectious diseases (EIDs). The International Health Regulations (IHR), 2005, of the World Health Organization (WHO) mandates all countries to improve health security against EIDs. The Asia Pacific Strategy for Emerging Disease (APSED), 2010, of the WHO regional offices identifies 10 strategic areas for compliance by not later than 2016. At present, compliance has reached about 70-80% in the region, with specific gaps mainly relating to laboratory services, hospital infection control, and cooperation for outbreak prevention and control with communities, other sectors, and countries.

9. Myanmar, located in South-east Asia and long isolated but now open to major population hubs in the region, has been identified as being a potential site for likely outbreaks of emerging infectious diseases (EID) such as SARS, Highly Pathogenic Influenza, or Ebola Hemorrhagic Fever, diseases with pandemic potential that may result in major mortality and economic meltdown. Myanmar is particularly vulnerable because its health system is still weak. It has developed an extensive network of health services, but limited staff capacity and financial constraints affect sector performance. Access remains difficult in some locations due to terrain and conflict. The Government is making efforts to strengthen state/region and district capacities, while civil organizations and NGOs are making efforts to reach out to remote villages and improve village capacity to address health problems, including prevention and control of infectious diseases.

10. While the burden of communicable diseases have declined overall in Myanmar, it remains high and there are new risks for the spread of communicable diseases because of (i) improved connectivity, (ii) urbanization, industrialization with associated slum formation and labor camps, (iii) increased drug resistance, particularly for hospital infections, TB, malaria and HIV, (iv) reduced compliance with preventive measures like vaccination, and (v) emerging and re-emerging diseases for which control measures are still being developed.³

11. The incidence of dengue has steadily increased, mostly in children. Outbreaks of diarrheal diseases, respiratory infections, influenza, and other conditions are also a major burden. While there has been significant expenditure on childhood immunization programs, there is evidence that as many as half those given measles vaccine may have received inactive vaccine, there are regular cases of diphtheria and whooping cough and several cases of suspected polio. For these reasons, it is necessary to maintain a capability to diagnose vaccine preventable diseases.⁴

12. There are other common infections that largely go unnoticed because cases are often missed in hospitals. Better diagnostics may help shed some light on the importance of these diseases.

b. Demand for laboratory services

13. The Government of Myanmar has begun providing a range of Pathology tests, including those for communicable diseases like dengue, free of charge. This has the potential to have a profound effect on laboratory surveillance for communicable diseases and for the validation of clinical reporting. It is too early to see what effect this will have in the pattern of requesting by doctors and the range of tests provided by Pathology laboratories. Given the widespread shortage of pathologists and medical scientists in MOH, it is likely that the system will be unable to meet much of the anticipated increase in demand.

14. The expanding private sector is providing an extensive range of pathology tests, some of which are rarely available in the public sector. It is likely that as clinicians become aware of the private offerings, demand will grow for the public sector also to provide these services.

III. Organization, Policies and Plans

a. Organization

15. There are three diagnostic laboratory systems in Myanmar – the Ministry of Health, Private Laboratories and the Laboratories in Tattmadaw (military) Hospitals. There appears to be little co-ordination of their activities and it is unclear how much, if any, of the laboratory surveillance data from the private and Tattmadaw systems is visible to MOH.⁵

16. With a growing middle class able to afford to pay for laboratory testing, the demand for the services of the private sector is growing and they are drawing staff from the MOH with the offer of higher salaries and employment in large cities. The capacity of the Tattmadaw

³ Asia Pacific Observatory on Health Systems and Policies. 2014. *Health Systems in Transition: The Republic of the Union of Myanmar Health System Review*.

⁴ MOH Myanmar Department of Planning and Department of Health. 2014. *Public Health Statistics 2012*.

⁵ MOH.. 2015. *National Policy on Health Laboratories in Myanmar*.

laboratories is unknown but anecdotal evidence suggests they are well equipped and they are located throughout the country. They are part of the extensive social support network the Tattmadaw has provided for the large number of serving personnel (almost 500,000) and their families (perhaps another 2-2.5 million).

17. Myanmar has a very complex and apparently overlapping, series of disease surveillance systems (Epidemic diseases; Diseases under national surveillance; Daily Hospital surveillance; Sentinel surveillance; Laboratory surveillance; Telephone based reporting system; Community based surveillance; Surveillance for anthrax, SARS, avian and pandemic influenza and emerging diseases). The Diseases Under National Surveillance system is paper based and reports seventeen diseases, syndromes and illnesses (diarrhea, dysentery, food poisoning, typhoid, measles, acute flaccid paralysis, diphtheria, whooping cough, neonatal tetanus, other tetanus, meningitis, acute respiratory infection [pneumonia], viral hepatitis, malaria, rabies, snakebite, TB) on a monthly basis. HIV is not on this list and has a reporting system of its own. Reporting is from the Township up, with Township authorities responsible for data collection down to Village tracts. There is no capacity to link the results of laboratory testing to the broad surveillance system.

18. With the devolution of significant responsibility for health care to the states, it is not clear who is responsible for outbreak investigation and responses. State health authorities believe that they would receive support from the national level whenever required.

19. For decades, there has been overlay between the Department of Medical Research (DMR) and the National Health Laboratory (NHL) in diagnostic activities for communicable diseases. This is resolving with DMR moving to a more research-based role. It has a BSL III (2+) laboratory. The National Health Laboratory is the national reference laboratory for most communicable diseases in Myanmar and its staff are familiar with international standards of safety and Quality.

b. Policies and Plans

20. Myanmar has a National Comprehensive Development Plan for the Health Sector from 2011-2031. The Disease Control Program in this Plan lists HIV and sexually transmitted infections (STIs), TB, Malaria, Filariasis, dengue, Leprosy and trachoma as priorities. The first program in the National Health Plan 2012-2016 is "Controlling communicable diseases". The Prevention and Control of Communicable Diseases Law (1995, revised 2011) would appear to be the legislation covering much of this project. Myanmar is a participant in APSED and a signatory to the IHR and has a draft National Policy on Health Laboratories in Myanmar which is expected to be signed into legislation in the first half of 2016. This is an aspirational framework without the detail necessary to drive implementation in any systematic manner. There is no formal national biosafety legislation.⁶

c. Progress

21. There has been an enormous commitment to the health system in Myanmar in the last few years in an effort to provide a comprehensive laboratory diagnostic system at least as far as the state level. Laboratories have been receiving as much as 80% of core equipment they have

⁶ MOH. 2015. *National Policy on Health Laboratories in Myanmar*.

requested. Unfortunately, there is a chronic shortage of staff for diagnostic laboratories due to the demand of the emerging private Pathology system and an inability of the Universities and the post-graduate medical education system to respond to this demand at short notice. These shortages are most profound the further one goes from Yangon and Mandalay.

22. In parallel with the support for facilities have come attempts to underpin diagnostic Pathology with Quality processes. This is a work in progress but one which is being impeded by a shortage of experienced staff to roll this out.

IV. Situation Analysis

a. Overall Assessment

23. The Health system in Myanmar is undergoing enormous change with a rapidly expanding private sector and significant financial commitments to the public sector. These improvements are being hampered by a significant shortage of experienced staff to operate the expanded services and an inability of the local undergraduate and post-graduate education facilities to fill these staffing gaps in the near future. Furthermore, the burden of overseeing these improvements is falling on a handful of individuals who have the knowledge and experience of “best practice” to ensure MOH gets value for money – and they are struggling to manage. At the state level, administrators are struggling to manage increased budgets, are struggling to understand the technical requirements of the expanding Pathology system and are slowing the rate of improvement in the diagnostic system. There is a need for a cadre of international professionals to support and mentor Myanmar counterparts at all levels of MOH – particularly in the area of diagnostic Pathology.

b. Facilities and Biosafety

24. MOH is investing significant sums on new facilities and on improving others but as there are no national biosafety guidelines yet, much of the recent Hospital development has produced laboratories that are not compliant with internationally accepted biosafety guidelines and will require minor works to make them compliant. Furthermore, some of the new laboratory benches are not strong enough to support the weight of the new equipment. While there has been significant and obvious investment in capital equipment, key minor equipment often is lacking e.g. there was a shortage of micropipettes in several of the laboratories visited and the life threatening practice of washing and re-using micropipette tips was common and probably unnecessary given the recent increases in funding. There appeared to be difficulties at some State hospitals obtaining funds for *recurring* costs – like for the purchase of disposable pipette tips. 24 hour electricity supply cannot be guaranteed in all laboratories but, in those visited, where this was the case, emergency generators were available to protect the blood supply.

25. There is an urgent need to develop and implement national biosafety guidelines and to train staff in the packaging of dangerous goods for transport. The National Policy on Health Laboratories in Myanmar states that international guidelines are followed but it doesn't state *which* international guidelines are followed and none of the non-metropolitan laboratories visited had a copy of any biosafety guidelines. None of the staff in the laboratories visited were wearing closed shoes, many were not wearing lab coats or gowns and gloves and safety glasses were uncommon. While most laboratories used special containers for sharps, laboratory waste was often removed from the laboratory without prior disinfection or sterilization, by untrained cleaners or groundsmen. The waste was commonly buried or burnt in pits in the Hospital grounds in areas accessible to the general public.

26. While Hospitals had laundry/autoclave facilities for surgical activities, these often were dangerously inadequate. Patients and their families provide their own bedding and this is washed by the families either at the Hospital (and dried over fences) or taken home for washing. Laboratory staff wash their laboratory coats at home without prior disinfection or autoclaving. These activities all pose a significant risk of transferring dangerous and/or drug resistant organisms into the community.

c. Laboratory services

27. There are 1041 Hospital laboratories in Myanmar. These range in capability from the National Health Laboratory in Yangon with national reference and oversight responsibilities to the regional laboratory in Mandalay and the remainder (Type A-C) varying in capability depending on the size of the Hospital to which they are attached. In general, the diagnostic laboratory system in the Ministry of Health has serious staff shortages that threaten the ability of the system to operate.⁷

28. Myanmar has invested significant amounts of money in equipping diagnostic laboratories, particularly at the State level. These purchases are overseen by the National Health Laboratory in Yangon and, in the visited laboratories, the equipment was of high quality and absolutely fit for purpose. There is a belief at the central level that State Laboratories are able to perform Microbiology and Histology analyses because the requisite capital equipment has been delivered. However, the utilization of this equipment is restricted by the staff shortages mentioned above and the state of the facilities in which they are to be used.

d. Quality improvement

29. There has been a significant investment in training NHL staff in Quality processes by the National Reference Laboratory in Melbourne, Australia, funded by AusAID. None of the State laboratories visited had Standard Operating Procedures (SOPs) for the tests being performed. This project should provide assistance to develop SOPs for all assays and for the operation of all laboratory equipment being used as part of the project.

30. MOH will need some sort of a routine laboratory audit or assessment process to drive improvement in the quality and safety of laboratory services. Although NHL had conducted an HIV External Quality Assurance Program throughout Myanmar with the assistance of the National Reference Laboratory in Melbourne, Australia, it was difficult to find details of the assessment when visiting laboratories. The Microbiology Section at NHL conducts *ad hoc* quality assurance programs for State Laboratories and there is evidence of corrective actions being taken where significant problems are identified. However, there are no national Quality Guidelines or system of systematic laboratory auditing. Such auditing would be problematic in the absence of National biosafety and quality guidelines. MOH needs to identify which international biosafety guidelines it proposes to adopt and to distribute these widely. It also should develop/utilize a set of Quality guidelines. Once these become part of the diagnostic laboratory toolkit, MOH should establish a national laboratory audit unit to audit all MOH

⁷ Asia Pacific Observatory on Health Systems and Policies. 2014. *Health Systems in Transition: The Republic of the Union of Myanmar Health System Review*.

laboratories every 3-5 years in order to assist them to comply with these guidelines. This project should support the development of a group within MOH to do this.

31. The NHL is significantly overcrowded and understaffed for the role it is required to play. NHL has indicated that it would need additional staff if it is to play any meaningful role in this project.

32. There also are significant challenges posed by the training of Pathologists and laboratory staff. It is extremely unusual for Myanmar Medical graduates to gain Pathology Fellowships overseas as had been common prior to 1990. The MSc and PhD programs undertaken by Medical Graduates in order to become Pathologists are seriously under-resourced financially and in the equipment and supervision available to candidates. The one year training program for Laboratory Technicians is of little benefit, particularly as these people often are left to work alone in poorly resourced, small and isolated Hospitals. The two year program, which involves significant time training at the National Health Laboratory is probably reasonable preparation for a Technician who will work mostly under supervision in a laboratory. The University of Technology Yangon and the University of Technology Mandalay provide four year courses leading to a Bachelor of Medical Technology degree. Although students spend considerable time in Hospital Laboratories during their course, much of the time is spent observing rather than “doing”. Key, basic, competencies appear to be lacking in graduates encountered during Laboratory visits. Few of the staff could dismantle, clean and calibrate a micropipette; none were confident to stain a blood film and perform a differential count and so were totally dependent of automated analyzers; none were confident to undertake routine maintenance on automated analyzers and none displayed an operational knowledge of essential biosafety guidelines.

33. The Universities of Medical Technology (Yangon and Mandalay) recognize the problem of staff shortages in Laboratories and are seeking permission/resources to expand their student intake. Control of these two Universities will move from MOH to the Ministry of Education in the next 1-2 years. The following steps would address many of these concerns and would be relatively inexpensive to implement in the Universities training Medical Laboratory Scientists:

- Minor works to make the University teaching laboratories compliant with Biosafety Guidelines (e.g. the W.H.O. Biosafety Guidelines.)
- Replace key pieces of old or inappropriate equipment in laboratories
- Ensure that there are enough micropipettes for all students to become competent in their use.
- Support the purchase of kits and reagents used to diagnose communicable diseases covered in this project in order to provide real life training for students.

All purchases should be co-ordinated with the National Health Laboratory to ensure equipment, tests and reagents are those used in State laboratories.

e. Support services

As mentioned above, management at State and Hospital level sometimes struggles to grasp the concept that laboratories require consumable items and not just equipment to operate. People in these administrative positions should have a period of laboratory-specific administrative training.

V. Proposal

a. Overall priorities

34. The priorities for this project are (i) to ensure that all project laboratories have the consumable items and small pieces of equipment to fulfil their role (ii) to provide in-service training to perform these roles safely and accurately and (iii) to support the training of undergraduate medical laboratory Scientists and Pathologists-in-training so they are laboratory-ready when they graduate to fill the vacancies that are threatening the operation of the diagnostic Pathology system outside Yangon.

b. Facilities and biosafety

35. In the absence of a nationally agreed Biosafety policy, the project should adopt the World Health Guidelines and distribute these to all laboratories. All project-funded training should include reference to and compliance with these guidelines.

36. As soon as the National and International Consultants are appointed they should visit all project laboratories and identify any remedial activities necessary to make the laboratories compliant with these guidelines. Consideration should be given to employing a mid-career laboratory scientist from within MOH as the national Consultant in order for the knowledge and skills of the International Laboratory Consultant to be retained within MOH at the conclusion of the project

37. MOH must formulate a policy for waste disposal. Burning and or burying waste in Hospital grounds is unsafe and not sustainable.

38. Provision should be made for training of at least two laboratory staff from each State in the transport of dangerous goods.

c. Laboratory services

39. There is no requirement for large scale purchase of equipment for the project because MOH has, and is, supplying most major items of equipment required by the non-metropolitan laboratories. However, it is likely that the initial laboratory audits carried out by the National and International Consultants will identify minor changes that need to be made to laboratories to make them safe or pieces of key equipment that are missing or not able to be made to function properly. There is likely to be a requirement for significant purchases of minor items of equipment like micropipettes and consumable items like disposable plastic ware and personal protective equipment.

d. Quality improvement

40. Quality improvement should begin with the training of Pathology staff. While it is beyond the remit of this project, the one year laboratory training should be discontinued and the role of the two year trained Technicians reviewed. Myanmar Universities are planning to try to double the output of Laboratory Scientists to try to meet the local demand. The Practical component of the undergraduate training within the Universities is severely under-resourced. The project should provide critical small items of equipment so that *all* students develop core skills and they are not required to work in large groups. The list might include micropipettes and the tips to go with them; small hematology and biochemistry analyzers like those in use in MOH laboratories

and small floor based autoclaves so all students. Support should be provided to develop competency based assessment of students in their final year.

41. MOH should identify and distribute Biosafety Guidelines to all laboratories. NHL should identify an appropriate tool to assist laboratories improve their Quality processes. Strengthening Laboratory Management Towards Accreditation in one possible tool.

42. The project should conduct joint workshops for Doctors and Laboratory Scientists in the diagnosis of communicable diseases related to this project (excluding HIV, malaria and TB). These should have a theory component covering signs, symptoms and case definitions and the principle of laboratory diagnosis. The students also should develop a comprehensive understanding of the national communicable disease surveillance system. The practical component should include the preparation of Standard Operating Procedures for procedures/processes being taught in the workshop as well as the performance and interpretation of laboratory tests. Training should be assessed with a written and practical examination. Students who pass the practical examination should be competent to perform a diagnostic test safely and correctly and to interpret and report the results.

43. Improvements in the Quality of diagnostic services will come when all laboratories have biosafety Guidelines and clear guidance about Quality. These improvements should be driven by regular (every 3-5 years) auditing of all diagnostic laboratories by a team of experienced laboratory auditors using an internationally accepted check list e.g. from the National Association of Testing Authorities of Australia. Ideally, the audit team would consist of experienced mid to late career Laboratory Scientists and Pathologists with no day to day responsibilities outside the Audit Unit.

44. The National Health Laboratory should be funded to participate on a regular basis in international Quality Assurance programs relevant to the project (except for HIV, TB and malaria). NHL also should develop national Quality Assurance programs for tests and laboratories involved in this project. If the preparation, validation and distribution of panels of samples is too difficult, project laboratories should refer a small number of positive and negative samples to NHL for confirmatory testing. NHL should develop a system for corrective action where problems are identified. The results of these national Quality assessments should be distributed to all participating laboratories but with the identity of each laboratory removed.

e. Support services

45. Once Quality systems are rolled out and operators are trained to maintain and calibrate equipment on a regular basis the demand for major maintenance should decrease. The exception is class II biohazard hoods which must be calibrated when they are delivered and every year thereafter. MOH should consider two options (i) call tenders for a contractor to perform this task to international safety standards or (ii) develop a capacity within MOH. Given the growing private Pathology sector and the likely increasing demand for this service, it is likely that a Myanmar contractor will emerge with the personnel and equipment to perform this task

46. The provision of diagnostic kits/reagents faces two challenges. The first is the preparation of specifications that ensure tests are of the highest sensitivity and specificity and their distribution in a timely manner. The International Consultant should assist with the preparation of specifications for equipment and kits/reagents for this project.

VI. Implementation and Monitoring

a. Implementation

47. If possible, the National Laboratory Consultant should be a mid-career Laboratory Scientist from within MOH. Several different individuals may fill this role in the course of the project. The National and International Consultants should visit all laboratories as soon as possible in the project to ensure they are safe and to confirm that proposed equipment purchases are required (there are a number of non-ADB players in this area), can be accommodated and that there are sufficient and appropriately trained staff are able to perform the tasks required. The content of in-service training workshops may be influenced by these visits.

48. The National and International Laboratory Consultants should assist in the preparation of specifications for all laboratory equipment and reagents. The contract for any BSL II biohazard cabinets must include a requirement for a full operational validation after it has been delivered to the designated laboratory. This must include a test to confirm the integrity of the HEPA filters.

49. Workshops to provide core training around the diseases covered by this project should begin as soon as practicable. They should incorporate key principles of Quality and Safety and the resulting competencies should be formally assessed.

b. Monitoring

50. The national and International Consultants should visit all project laboratories every year to assess progress, to identify any issues and to initiate corrective actions. The on-site component of these visits should be able to be completed in half a day.

51. The Consultants should establish a routine of regular meetings with counterparts at the National Health Laboratory to discuss laboratory related issues and to monitor the results of and project-related QA programs.

VII. Conclusion

52. In conclusion, MOH is well underway to establish a nation-wide network of public laboratory services that will also support surveillance for infectious diseases, starting with state/regional hospitals. With additional funding, MOH has been able to provide most of the equipment for laboratories in state and regional hospitals. The capacity for HIV, tuberculosis and malaria testing is already well advanced down to the township or station hospital.

53. Major constraints to improve quality of services are serious staff constraints, both in numbers and in capabilities, lack of supplies due to recurrent budget constraints, biosafety issues of facilities, and lack of guidelines and SOPs for laboratory quality and biosafety. While NHL has a strong core team, it is overburdened with work and will need additional staff and technical assistance to play a meaningful role in rolling out laboratory quality improvement, assurance and audit.

54. The Project may support laboratory system development for improvement of laboratory quality and biosafety, including support for pre-and in-service training and supplies rather than procurement of major equipment.

Appendix 1: Laboratory Summary Matrix

GMS Health Security: Laboratory Summary Assessment

A. GMS LABORATORY SERVICES SUMMARY				
Laboratory Services	Cambodia	Lao PDR	Myanmar	Viet Nam
1. National and Subnational Laboratories and Referral Abroad				
<i>Name of national laboratories</i>	National Institute of Public Health NIPH	National Centre for Laboratories and Epidemiology NCLE	National Health Laboratory NHL	National Institute of Hygiene and Epidemiology NIHE
<i>CDC/EID Function/Services</i>	Diagnostic tests up to BSL2+, quality control	BSL2+. Biological blood analysis, PCR (Elisa, vibro, cury-bacterian, Ecoli.) culture. Serology, Molecular, cell culture for influenza.	BSL2+, training, some research, quality control. Expanding range of pathology tests to improve surveillance	Diagnostic tests up to BSL3, vaccine production, training, research, quality control
<i>Key Issues</i>	Capacity for antibiotic sensitivity testing (AST)	Lacking of GoL budget support for reagent and supply	Major staff constraints, outdated facility and equipment	Lack of laboratory space
<i>Names of specialized CDC/EID hospitals with lab</i>	All major tertiary hospitals in Phnom Penh, Calmette hospital, Pasteur	5 centrals hospital: Mahosot, Friendship, Setha, 103, 5Mesa, MCH and Pediatric	National Hospital Yangon Regional Hospital Nay Pyi Taw, Regional Hospital Mandalay Department of Medical Research	Bach Mai Infectious Diseases Hospital, Hanoi, all major tertiary hospitals in Hanoi and HCMC
<i>CDC/EID Function/Services</i>	Disease control and patient care	Serology, biological blood analysis, PCR and UTI	Care of infectious patients, diagnoses	EIDs and other infectious diseases
<i>Key Issues</i>		Standard serology and biological no culture	Overlapping CDC roles, overlapping surveillance systems, low immunization quality needs surveillance	
<i>Names of other public CDC labs/research</i>	NCHADS, NCTB, NCPEMC	CHASS, NCTBC, CNMEP	NPT/Mandalay laboratories	VAAC, NTBI, NIMPE, NIHE,

<i>institutions</i>			NHAP, NTP, NMP	
<i>CDC/EID Function/Services</i>	Linked to specific technical needs of the National Programs including Dengue, TB, malaria, HIV/AIDS programs	CPME – malaria, parasite intestinal and PCR TB – sputum and blood FDD – food borne disease and chemical product Dermatology Center	For TB/HIV/malaria programs	For TB/HIV/malaria programs
<i>Key Issues</i>	Coordination	Specialist lab for each purpose. costly than hospital	Roles need to be more clearly defined, reporting	Coordination and reporting
<i>Names of other institutes involved in EID/CDC</i>		Military lab for malaria at Phontong	Military (Tattmadaw)	Military
<i>Key Issues</i>			No coordination/reporting	
<i>Names of major research labs</i>	Institute Pasteur in Cambodia	Institute Pasteur Mérieux	Institute Pasteur is linked to NHL	NIHE, IP Nha Trang IP HCMC
<i>Function/Services</i>	Biomedical research and surveillance of infectious diseases, platform for comprehensive medical and biological analyses unique in Cambodia, international vaccination center	Completed serology test and research study		Biomedical research and surveillance of infectious diseases
<i>Key CDC/EID Issues</i>		Research purpose major		
<i>Global/Regional referral labs for the country</i>	France, USA, Japan, Australia	France, Denmark, England, New Zealand, Greece, USA, Japan	UK, France, Japan, Korea, USA	USA, France, Japan, Australia
<i>Function/Services</i>		IQA/ EQA		

2. Regional Laboratories				
<i>Names</i>		Luangphabang, Military 107, ODX, SVK and CPS	NPT, Mandalay	Pasteur Institutes in HCMC, Nha Trang, Central Highlands
<i>Function/Services</i>		biology and serology, some culture in for research study only	Referral laboratories	Infectious diseases control
<i>Key CDC/EID Issues</i>			Role in outbreak response not clear vis-à-vis NHL	
3. Provincial/State laboratories				
<i>Number</i>	25	17 provincial hospital lab	15	64
<i>Function/Services</i>	CPA guidelines: "provision of high quality service in medical analysis responsive to the need for diagnosis which are all necessarily pertinent to general medical and surgery services in a referral hospital"	biology and serology	Referral laboratories – general diagnostics including histology and microbiology.	General hospital laboratories for patient diagnostics Provincial medicine laboratories for infectious diseases control, food safety and screening for NCDs
<i>Key CDC/EID Issues</i>	Different capacities	Some provinces have army laboratory	New an appropriate equipment provided to state laboratories, however there is lack of capable staff and 2 state laboratories do not have a pathologist. Not clear who is responsible for laboratory services for outbreak response	High workload of provincial laboratories

4. District laboratories				
<i>Number</i>	92 referral hospitals with laboratory services based on the levels of CPA (1-3) with 1 is the lowest.	148 district laboratories	48 district hospitals	All district hospitals in 64 provinces
<i>Function/Services</i>	Id. To provincial lab	Biological and serological analysis	Hematology, parasitology, biochemistry, urine analysis	Hematology, parasitology, biochemistry, urine analysis
<i>Key CDC/EID Issues</i>	Different capacities	Basic analysis with para-biological machine		
5. Community/township laboratories				
<i>Types and Number</i>	N/A	768 HC lab with RDT & microscopic 4 Community lab.	324 Small lab, not including some labs in station hospitals	One-person lab
<i>Function/Services</i>	Sometimes rapid test for TB, HIV, malaria, dengue	basic analysis using para biological machine	Microscopy for malaria, TB, rapid test for malaria, TB, HIV if supplies available	Microscopy for malaria, TB, sometimes rapid test for HIV, dengue
<i>Key CDC/EID Issues</i>		Lacking of lab staff		No proper facility
6. Private laboratories				
<i>Types and Number</i>	In all urban locations and some rural locations, probably over 3,000	All 1,044 private clinic and 16 private hospital have their own lab	In major cities and towns	Over 10,000 private labs either in clinics or separate
<i>Function/Services</i>	Patient diagnostics	Lab for diagnostic	Patient care	Patient diagnostics, no public health reporting unless for notifiable diseases
<i>Key Public CDC/EID Issues</i>	No license, no inspection	Many private clinic got license from MoIC and under MoH	Reporting to health department	Insufficient inspection

7. Training institutions for laboratory staff				
Number of Universities		University of Health Science	University of Yangon and Mandalay	
<i>Course/duration/intake</i>		6 years	Bachelor of Medical Technology, 4 years, to be operated by MOE in 1 year	
<i>Key Issues</i>			Not enough skill training, Need to improve biosafety of teaching labs, and provide new equipment, test kits and micropipettes	
Number of Colleges		Faculty of Medical Technology		
<i>Course/duration/intake</i>		4 years course (bachelor) 3 years course(semi-bachelor) in SVK		
<i>Key Issues</i>		After MA they can continue study in Medical science technology		
Number of Schools	One Technical School for Medical Care (TSMC) in Phnom Penh	SVK, CPS and LPB	Laboratory technician operated by MOH	
<i>Course/duration/intake</i>	3 years	1,6 years course	1 year	
<i>Key Issues</i>			Insufficient training to work independently in field lab	
8. Blood banks				
<i>Key Issues relating to EID</i>	To define clear linkage with EID (e.g. antimicrobial resistance, infection prevention and control)	National Lao Blood banks under Lao Red Cross scan for HIV, Malaria and STD		

B. GMS LABORATORY SYSTEMS SUMMARY				
System features and performance	Cambodia	Lao PDR	Myanmar	Viet Nam
Strategic Element 1: Developing an operating framework for improving laboratory services				
1. Legal Framework				
<i>Laboratory services policy/strategy for CDC/EID in place?</i>	Yes	Yes	Draft Laboratory Plan	Yes
<i>Legal frameworks for laboratory services quality and biosafety?</i>	Yes	Operational Guideline for Health Lab Network in Laos	No biosafety legislation	Yes
<i>Legal framework for private laboratory services for CDC/EID?</i>	In process	Yes, but could not control	No	Yes
<i>Legal framework for laboratory accreditation and audit?</i>	In process, for 25 sites for national and provincial levels	Yes	No	Yes
<i>Other major legal frameworks of relevance to CDC/EID labs?</i>	Relevance for CDC laws	National strategy CDC lab No. 165 in 2014		
2. Organization				
<i>List MOH Departments managing laboratory services?</i>	Department of Medical Services (Bureau of Medical Laboratory Services)	DHS, HCD, FDD, CDC and Training Dept.	Department of Hospital Services	General Department of Preventive Medicines, Viet Nam Administration of Medical Services
<i>Is there one MOH department overall in charge of lab services?</i>	Yes	No	No	No
<i>Are laboratory services headed by DG or DDG?</i>	No	No	No	No
<i>Is there an active and effective planning structure?</i>	Annual Operational Plan (AOP) development	AOP	AOP	AOP

<i>Is there an active and effective national coordinating committee?</i>	Yes (Sub-technical Working Group on Blood Safety and Laboratory Services: SWGBSLS))	Yes, Dr Phengta Vongphachanh	Yes	Yes
<i>Is there an active and effective technical workgroup/taskforce?</i>	SWGBSLS	Yes, including 16 members	Yes	Yes
<i>Other issues?</i>		Twice meeting a year		
3. Planning, Management, Monitoring				
<i>Is there a comprehensive laboratory development program?</i>	Yes, through the Nat Strategy for Medical Laboratory Services 2015-2020	Yes		Separate for GDPM but now being integrated
<i>Is a laboratory five year plan and budget approved?</i>	No costed plan	Yes		Separate plans
<i>Are laboratory services financed through annual plans?</i>	Yes	No, sometime get sometime no	Yes	Yes
<i>Are lab management /SOPs in place?</i>	Yes	Yes		
<i>Is the laboratory management information system functioning?</i>	Early stage of development, need more logistic support	Not effect to all		
<i>Is there a functioning central lab database system?</i>	To be finalized by the end of 2015	Some time and rarely updated		
<i>Is there monthly reporting to the national oversight agency?</i>	Yes	Yes		
<i>Is action taken based on reported performance of laboratories?</i>	Yes, partially	Some time		
<i>Other issues?</i>				

4. Financing				
<i>Is the annual laboratory budget received in time and sufficient?</i>	Not sufficient	Not on time and not sufficient	Cash flow problems	
<i>If not, what is typically being cut/skipped?</i>	Biosafety, Lab information system, maintenance	Always reagent and equipment	Supplies	Supplies
<i>What % of laboratory budget allocations can be spent annually?</i>	Around 14% in 2015	80%		
<i>What % of the non-salary recurrent budget for laboratory services is financed (i) by government, (ii) by donors, (iii) out of pocket?</i>	Donor support usually in kind, through trainings	23% government 39% donor 38% Out of pocket and other		
<i>Who decides how to spend laboratory allocations?</i>	MOH Management (Minister)	Steering committee	Director	Head of Laboratory
<i>Are sources used in a balanced manner and used efficiently?</i>	Rationalized through the Sub-technical working group on blood safety and laboratory services	No	Yes	Yes
<i>Other issues?</i>				
Strategic Element 2: Reforming and integrating laboratory services				
1. Leadership				
<i>Is there proof of strong leadership and commitment to evidence based decision making including better use of laboratory services?</i>	Yes, National Strategy for Medical Laboratory Services 2015-2020	They said Yes	Yes	Not sure
<i>Is there strong advocacy of senior management on importance of improving quality and biosafety of</i>	Yes	Not sure	Yes	Yes

<i>lab services?</i>				
<i>Is government committed to sustain laboratory financing?</i>	Yes	No	Yes	Yes
<i>Is government considering contracting out to the private sector?</i>	No	No	No	No
<i>Other issues?</i>	Budget constraint			
2. Strategic Planning				
<i>Is there clear guidance on standards of laboratory services?</i>	yes	Yes	Some	Yes
<i>Are standards based on burden of diseases and expected demand?</i>	Yes, geared towards IHR/APSED	yes	No	Yes
<i>Which laboratories are often seriously underused?</i>	Need more training for improved use by clinicians	Don't have yet	Small laboratories	District Preventive health center laboratories
<i>What mainly explains low demand for lab services, low public demand, private sector competition, limited range of diagnostics, lack of staff, poor quality, limited opening hours?</i>	Lab services underused by clinicians	Limited range of diagnostics, lack of staff and limited opening hours	Lack of staff an supply	Low demand for services
<i>Are there mechanisms to rationalize laboratory services?</i>	Yes, through QMS, QA, Biosafety, SOP standards	Yes	Not yet	Plan to integrate district preventive and hospital laboratories
<i>Are there plans to adjust laboratory services to make these more effective and efficient?</i>	Training based on real life situation when an unknown health event occurs → rapid response team, lab, infection control and clinicians working together)	In 5 year plan (2016-20) has several point for improving their services	Build capacity of NPT and Mandalay laboratories to reduce work of NHL	As above

<i>Other issues?</i>				
3. Coordination				
<i>Are roles of various national laboratories clear?</i>	Yes (TORs)	Yes	No	Yes
<i>Are roles clear between levels of laboratory services?</i>	Yes (CPA guidelines)	Yes	No	Yes
<i>Is a specimen referral system in place?</i>	Yes, as specified in Quality Manual	Yes	Weak	Yes
<i>Are there formal links with clinical services?</i>	Yes, in lab with QMS	Yes	Yes	Yes
<i>Is there a regional/global referral for difficult diagnostics?</i>	Yes through IATA, ICAO	Yes	Yes	Yes
<i>Is there a move towards (de)centralized laboratory services?</i>	CPA guidelines: Lab only available at district level	Yes	Yes	No, need to centralize to make more efficient
<i>Are there efforts for horizontal integration of laboratory services – curative and preventive?</i>	Yes, through CAMLIS	Yes, system in place not sufficient fund support	Being discussed	Yes, as above
<i>Is there a move towards integration with the private sector/contracting out?</i>	No	No	No	No
<i>Are there formal links with other laboratories such as for animal health, water quality and food product inspection?</i>	Yes, especially with the Ministry of Agriculture (NaVRI)	Yes Quarterly meeting	?	Yes
<i>Has mapping of stakeholders of lab services been done?</i>	Yes, by the MOH Bureau of Medical Laboratory Services (BMLS)	yes	No	No
<i>Is there effort to improve</i>	Yes	In process with	No	No

<i>networking at local, national, regional and international levels for sharing experience and resources?</i>		international, regularly with local, national and regional		
<i>Is there a coordinating body to create collaboration among partners at local, national, regional and international levels?</i>	Yes, through the Sub-technical working group for blood safety and laboratory services	Yes	No	No
<i>Are GMS countries supporting each other for EID diagnostics</i>	Yes	Yes	Yes	Yes
<i>Other issues?</i>				
4. Evaluation				
<i>Latest comprehensive Lab assessments?</i>	2013- 2014- 2015	5 provinces under EU 2013, 12 provinces under ADB in 2014		
<i>Latest national lab review?</i>	2015 (Nat Strategy 2010-2015→2015-2020)	July 2014		
<i>Is annual plan assessed each year?</i>	Yes, every January	Yes	?	?
<i>Are regular internal laboratory discussions required?</i>	Yes, through sub-technical working groups at all sites with microbiology	Yes	?	?
<i>Are regular laboratory discussions with clinicians required?</i>	Yes	Yes	?	?
<i>Are special studies done like fever study, immunization study to assess effectiveness of disease control programs?</i>	Yes, Fever study with NAMRU	Yes	Proposed	Proposed
<i>Is information used</i>	Yes, Cambodia Laboratory	Yes	No	No

<i>efficiently to improve lab services?</i>	information system (CAMLIS) under development to support CAMEWARN and anti-microbial resistance (AMR) effort			
<i>Are there periodic evaluations to measure the degree to which individual laboratories have implemented recommended changes?</i>	Yes, but irregular	Yes, by WHO technician support in NCLE	WHO	WHO
<i>Other issues?</i>	Budget constraint, not enough supervision		Budget constraint	
Strategic Element 3: Improving Biosafety of Laboratories				
<i>Are Biosafety SOPs available?</i>	yes	Yes	No	Yes
<i>Is there regular assessment of all aspects of biosafety?</i>	First assessment in 2015	One a year	No	Yes
<i>Do facilities use biosafety score cards and plan for improvement?</i>	Yes	Yes	No, new hospitals are not compliant with international biosafety standards and need modifications	Yes
<i>List any major biosafety system problems?</i>	No standard BSC, no financial resource for decontamination		Lack of funds, lack of biosafety guideline	
<i>Does every lab has an appointed biosafety person?</i>	Yes, for national referral lab & sites with microbiology	Yes	Yes	Yes
<i>Are in charges of laboratories specially trained in biosafety?</i>	yes	Yes	Yes	Yes

<i>Is there a national training program for biosafety?</i>	No formal curriculum, only short courses ToT from Singapore TA for curriculum development needed	Yes	No	Yes
<i>What proportion of staff is trained/qualifies in biosafety?</i>	All lab staffs at sites with microbiology	100%at national level		All in charges
<i>Are there national standards for design of lab facilities for biosafety including for liquid and solid waste management?</i>	yes	Yes	WHO standards	Yes
<i>What are the main facility problems for biosafety in provincial and district laboratories such as lack of space, facility design, waste management, etc?</i>	No standard	In some province no space for waste management and many district depend on facility design	Outdated facilities, not using protective clothing, improper handling of waste by untrained persons	Waste management
<i>Are there national standards for biosafety equipment of laboratories?</i>	No, TA needed	yes	No	Yes
<i>What are the main equipment shortages for biosafety in labs?</i>	Backup electricity, BSC spare parts	Drainage waste water use the same main drainage	Incinerators	Waste management equipment
<i>Which consumables are mostly out of stock for biosafety?</i>	Not sufficient	Coach, shoe and hand washing liquid	Basic cleaning supplies	Detergents, gloves, brushes, etc.
<i>Other issues?</i>	No budget to certify, not enough training and supervision			
Strategic Element 4: Improving Quality of Laboratory Services				
<i>What hard data are available on lab quality</i>	IQC needed to get data on lab quality			

<i>problems?</i>				
<i>What are the common problems in quality of lab services?</i>	Levy Jennings Charts	Lack of reagent at national level and at provincial and district lack of clean water supply	Lack of calibration, staff skills, supplies, lack of minor equipment	Staff skills
<i>How does MOH show commitment to address these problems?</i>	Refresher trainings, labs to record data and take corrective actions	Some problems were solved and some could not yet		
<i>Are quality objectives clearly defined and documented?</i>	Yes, in CPA guidelines	Not all were recorded	No	Yes
<i>Is the lab QI design clear and understood within MOH?</i>	Yes, as stated in the national strategic plan 2015-2020	Yes		Not sure
<i>For which levels is a quality improvement plan being rolled out?</i>	National referral labs & CPA3+microbiology labs	Central and provinces	Central	Provinces
<i>Are protocols and SOPs available for IQC?</i>	Yes	Yes	no	Yes
<i>Are protocols and SOPs for IQC available on line?</i>	Not yet, to be synchronized to become standard	No	no	
<i>What % of labs has satisfactory IQC > 50%, 80% in 2014?</i>	2015: 44% for biochemistry 61% for hematology	80%		
<i>What are the major issues in implementing IQC?</i>	Trainings, support reagents	Long time of transport specimen		
<i>What % of labs were examined in external quality assurance?</i>	31 out of 89 labs (34%)	5%	HIV QA done, but not available in visited labs NHL does periodic QA	
<i>What % of examined labs has satisfactory EQA > 50%, 80%?</i>	2014: Bacterio: 100% Serology: 100% Hemato: 49% Biochemistry: 74%	85%		
<i>What are the major</i>	Refresher trainings; follow	High cost of transport		

<i>issues in implementing EQA?</i>	up	and fee		
<i>What % of labs are ISO certified at what level</i>	Not yet	90% WHO		NIHE: nil Provincial level: 25%
<i>Is there a laboratory audit system in place up to what level</i>	Internal: working group External: not yet available	Yes for basic	No audit system in place	No
<i>Is laboratory registration and accreditation required for public and private laboratory services</i>	Yes	Yes in rule not all practices	Yes	Yes but not in practice
<i>Is there a registration and accreditation agency</i>	MOH Department of Hospital Services (mostly registration)	Yes	Department of Hospital Services	VAMS
<i>What % of private laboratories are registered and accredited?</i>		25%		
<i>Other issues?</i>	Improve private sector, QMS, Bio-safety			

Strategic Element 5: Improving Laboratory Resources

1. Staff

<i>Is there an approved HRD plan for laboratory services?</i>	Yes. The national Examination. For 2015, a total of 1,030 lab technicians trained. MOH intake:18 among all the 433 staffs approved by the Government	Yes	No	Yes
<i>Is there a personnel management system for lab staff?</i>	Yes	Yes	No	Part of general system
<i>What are the major documented issues in HRD in laboratory</i>	Lack of staff at lower level	lack of staff at lower level, lack of lab managers, low pay,	Lack of qualified staff at lower level	Staff constraints at lower level

<i>services, e.g., lack of lab managers, lack of staff at lower level, shortage of specific cadres, staff drain to private sector, staff motivation, lack of career opportunity, low pay, staff quality?</i>		staff quality		
What are MOH priorities to be addressed?	Staff quality/quantity as per CPA guidelines (CPA1: 3; CPA2:3-5; CPA3: 6-8)	Improve staff quality at low level	Staff quality	Staff quality
<i>Other issues?</i>				
2. Pre-service Education				
<i>Is there coordination with MOE on standard curriculums?</i>	Yes, for curriculum update	Yes but school is under MOH	Yes, higher level training done by MOE, lower level by MOH	
<i>How many students enter lab studies annually all levels?</i>	2015: 18 lab staffs/MOH total 433)	70 to 100		
<i>Do students have sufficient basic science preparation?</i>	Insufficient	Insufficient	Insufficient	Insufficient
<i>Are there major shortages of staff, facilities, equipment, supplies?</i>	Yes	shortages of facilities, equipment, supplies	Yes	No
<i>Are exams serious and rigorous?</i>	No, support by JICA, US CDC, but not strict	Not all, some	Yes	Yes
<i>Are government positions available after graduation?</i>	18/433 (2015)	Not all student, many position available in province and district; student not prefer to go far from home	Yes	Yes
<i>Are schools certified and inspected annually?</i>	Yes, but irregular	Yes	No	No
<i>Other issues?</i>				

3. In-service Training				
<i>Is in-service training ad hoc driven or follows agreed annual plan?</i>	both	Some		
<i>Average staff training per year as % of total staff?</i>	In 2013-2014: 120 lab staff trained in bio-safety; 2015: 15 staff each trained on hemato & bio-chemistry (July 2015: MOH staff=20,811 with 491 secondary lab staff and 72 primary lab staff)	3%		
<i>Mostly class room or practical training?</i>	both	Yes		
<i>What % of labs have NGO partnership or mentoring?</i>	Specific to NGO area of support	30%		
<i>Are there on-line training programs?</i>	no	No		
<i>Other issues?</i>		At NCLE has on job train by WHO lab technical staff other lab no		
4. Equipment				
<i>Is there a standard essential equipment for each level?</i>		Yes	Yes	
<i>What are common equipment items lacking in many laboratories?</i>		Central level not many thing In province still have	Most items available	
<i>What are common reasons for low use of equipment?</i>		Not existing of how often used Check for using purpose	Lack of skilled staff	
<i>Are purchased</i>		Yes, often	No, purchased	

<i>equipments often of substandard quality?</i>			equipment is appropriate	
<i>How can the procurement of quality equipment be assured?</i>		Procurement based on specification	Maintain technical selection committee	
<i>Is there a system for equipment maintenance and calibration?</i>		Yes	Centralized, needs training of staff to do their own calibration	Yes, maintenance contracted out for some equipment, and team goes round to calibrate biosafety cabinets
<i>Is equipment being leased?</i>	No	No, not leased	No	No
<i>Are there qualified staff trained in preventive maintenance?</i>		Based on SOPs after trained	Yes but few	
<i>Are there SOPs for maintenance and calibration?</i>		Yes	Yes but not widely used	
<i>Other issues?</i>				
5. Supplies				
<i>Is there a standard list of supplies for various levels of labs?</i>	Yes (standard tests for each CPA level)	Yes, for EU project and some ADB	Yes	
<i>Which are the major stock outs for laboratory services – reagents, glassware, PPE, rapid tests?</i>	Mostly reagents to run IQC tests	Some stock out of PPE in province, NCLE stock out of some reagents		
<i>Is there a national stock keeping system for lab supplies?</i>	Yes, at Central Medical Store	No		
<i>Are lab supplies purchased directly from the private sector?</i>	Centrally procured if from MOH, direct purchase if from HEF	Depend on project procurement		
<i>Are lab supplies mainly paid from patient fees?</i>	About 70% covered by MOH	No		

<i>Are supplies properly stored?</i>	Yes	Yes		
<i>How are supplies disposed of if out of date?</i>	N/A: Supplies are to be used before expiry date	Specimen for training		
<i>% need covered for rapid tests for malaria, HIV, TB, and dengue?</i>	Dengue: 100 tests/year	90%		
<i>Are particular tests missing?</i>	Dengue	Provincial level assessment needs		
<i>Other issues?</i>				
6. Technical assistance				
<i>Agencies providing major funding</i>	WHO, DMDP (Developing Microbiology Diagnostic Program), Mérieux Foundation, USCD, NAMRU2	ADB, EU, WHO, CDC(USAID)		
<i>Agencies providing technical support</i>	WHO, DMDP, TLL (Temasek Life science Laboratory), AFRIMS	EU, ADB, WHO, CDC(USAID) NIED(Japan)		
<i>Are there NGOs/INGOs/experts providing mentoring</i>	US CDC, ITECH, DMDP,	5 TA		
<i>Are lab staffs regularly engaged in technical associations, networks, community of practice?</i>	Newly created Lab Association (Chair: Pharm. Ket Vansith)	Yes		
<i>Are lab staffs regularly exposed to workshops, formal meetings, professional discussions, web sites?</i>	Yes	Yes		
<i>Other issues?</i>	Coordination/synchronization			

C. GMS PUBLIC LABORATORY ASSESSMENT SUMMARY				
Equipment and Supplies	Cambodia	Lao PDR	Myanmar	Viet Nam
National/Regional Public Health Laboratories (add any other major lab if this is a MOH priority)				
<i>List major items of equipment not available, not functioning, or old.</i>		Inventory list a NCLE Provincial level some existed list		
<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Zika virus		
<i>List gaps in staffing.</i>				
<i>List safety equipment (e.g. washing machine, autoclave, PPE, not available, not operational or old.</i>		NCLE- autoclave Province- autoclave needs for more purpose use at least two per each lab		
<i>List safety supplies in short supply incl PPE, gowns.</i>				
Regional/State, Provincial, and District Laboratories, (select questions as applicable, sample range of facilities)				
1. Biosafety				
<i>Is lab space adequate?</i>		not for biosafety		
<i>Can all doors and windows be closed?</i>		Some new hospital could closed, not for old hospital		
<i>Is Laboratory air conditioned?</i>		Yes, some		
<i>Are PPE, lab shoes, cabinets and wash-up</i>		Not all lab in provincial hospital		

<i>available at entrance?</i>				
<i>Is laboratory clean (e.g., benches, corners, alcoves for storage)?</i>		Some laboratory at provincial hospital		
<i>Is equipment clean (e.g., micropipettes, fridge)</i>		Yes		
<i>List biosafety equipment (e.g. autoclave, personal protective equipment) not available, not operational, or old?</i>		Yes existing for 5 provinces of EU project in attached file		
<i>List shortages of biosafety disposables?</i>		No		
<i>Is there a functioning system of liquid waste management</i>		Yes		
<i>Is there a functioning system of solid waste management?</i>		Yes		
<i>Is solid waste first autoclaved?</i>		NCLE yes, Some 5 provinces only		
<i>Is solid waste burned?</i>		Some burned some throw with public waste		
<i>Is incinerator working and up to standard</i>		Some province of EU project and some of big province (LPB, VT province)		
<i>Is solid waste dumped in compound or where?</i>		In compound dumped		
<i>When was last staff training for biosafety?</i>		May 2015 in 5 provinces only, March to May 2015		

		for all		
<i>Who is in charge of biosafety?</i>		Dr Noi Kaseumsy Biosafety officer in each province		
<i>List any other problem in biosafety.</i>		Municipality waste dumped in compound is not aware of biosafety in town No, existing biosafety law for legacy safety to population(lawyer for drafting) No quality of biosafety standard in each health facilities		
2. Range of Laboratory services				
<i>Is there a plan for lab development?</i>		Yes		
<i>List gaps in staffing.</i>		Will support list later		
<i>List critical diagnostic assays not available.</i>		Zika		
<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Will support list later		
<i>List major items of equipment not available, not functioning, or old.</i>		Autoclave not enough because two are broken		
<i>List lack of supportive equipment like fridges, transport box, stools.</i>		Will support list later, almost complete items for all province		

<i>List lack of testing supplies including reagents, rapid tests, disposable labware.</i>		Will support list later		
<i>How many tests per month total?</i>		800 tests per month		
<i>List top five diagnostics.</i>		Influenza, Dengue, Stool culture, Gen.pack culture and meales		
<i>How many referrals per month?</i>		NCLE, some		
<i>Referrals for what?</i>		For quality assurance		
3. Quality of Laboratory services				
<i>List gaps in in-service training for all staff.</i>		On the job train on quality 6 provinces (EU+KM) on quality assurance		
<i>List gaps in quality improvement program.</i>		NCLE- drafting standard of quality improvement program		
<i>List gaps in SOPs.</i>		Yes , existing		
<i>List gaps in equipment manuals.</i>		Yes, not completed		
<i>When micropipettes were calibrated last?</i>		More than one year		
<i>Maintenance and calibration records available for equipment?</i>		No, just small supported from EU		
<i>List problems in calibrating equipment.</i>		NO		
<i>List problems in maintaining equipment.</i>		Yes		
<i>List gaps in quality assurance program.</i>		NO		

<i>Is most equipment available?</i>		Some		
<i>Are many equipments due for replacement?</i>		Several equipment need replacement		
<i>Who maintains, contracting out?</i>		No		
<i>Leased equipment?</i>		Not available		
<i>Is there a budget for maintenance?</i>		NO		
<i>Is laboratory i/c monitoring lab performance?</i>		No		
<i>Any other issues?</i>				
4. Laboratory Management				
<i>Level and years of experience of Lab in charge?</i>		1998 as EPI and lab		
<i>Is there an annual lab plan and budget?</i>		Yes		
<i>Are SOPs available for Lab management?</i>		No		
<i>Is there record of Lab management meetings?</i>		Weekly meeting (minutes)		
<i>Is there a system of Lab staff supervision?</i>		Yes		
<i>Is computer and internet available?</i>		Yes		
<i>Are monthly reports submitted as required?</i>		Yes		
<i>What proportion of lab services is financed by government, partners and out of pocket?</i>		23% government 39% donor 38% Out of pocket and other		
<i>List gaps in financing.</i>				

<i>Has the lab been certified/accredited?</i>		National influenza center, National Meals center and JE(WHO)		
<i>Has the lab been audited?</i>		Yes, on program based		
Community laboratories				
<i>Type of available staff?</i>		Yes, 3 staff each District		
<i>Cleanliness?</i>		Not up to standard		
<i>Lab gowns available?</i>		Yes		
<i>Microscope working?</i>		Yes		
<i>Microscopy supplies incl reagents and collection supplies?</i>		yes		
<i>Power stabilizers and battery?</i>		No		
<i>Malaria rapid test?</i>		No		
<i>Dengue rapid test?</i>		No		
<i>Transport box?</i>		EPI box		
<i>Other tests?</i>		Par clinic blood test		
<i>How many tests per months total?</i>		?		
<i>How many referrals?</i>		?		
Technical Schools				
<i>Benches and stools?</i>	Not enough	Yes	Yes	Yes
<i>AV equipment?</i>	Yes	Yes	Yes	Yes
<i>Computers?</i>	Not enough	Yes	Not enough	Yes
<i>Teaching microscopes?</i>	Not enough	Not enough	Not enough	Not enough
<i>Microscopes?</i>	Yes	Yes	Yes	Yes
<i>Weighing scale??</i>	Yes	Yes	Yes	Yes
<i>Centrifuge?</i>	Yes	Yes	Yes	Yes
<i>Water bath?</i>	Yes	Yes	Yes	Yes
<i>Hematocrit reader?</i>	Yes	no	Yes	Yes
<i>Micropipettes?</i>	Not enough	Not enough	Not enough	Not enough

<i>Reagents?</i>	Not enough	Not enough	Not enough	Not enough
<i>Rapid tests?</i>	Not enough	No	Not enough	Not enough
<i>PPE?</i>	Not enough/old	No	Old	Yes
<i>Biosafety teaching material?</i>	Yes	Yes	Yes	Yes
<i>Laboratory manual?</i>	Yes	Yes	Yes	Yes
<i>Laboratory SOP?</i>	Few	Few	Some	Most

Project number: 48118-REG

**R-PPTA 8842: THE GREATER MEKONG
SUBREGION HEALTH SECURITY PROJECT**

2016

Table of Content

Acronyms	1
Executive Summary	2
I. Introduction	4
a. <i>Assignment</i>	4
b. <i>Project Summary</i>	4
II. Major public health problems	5
a. <i>Epidemiology</i>	5
b. <i>Demand for laboratory services</i>	7
III. Organization, Policies and Plans	7
a. <i>Organization</i>	7
b. <i>Policies and Plans</i>	7
c. <i>Progress</i>	8
IV. Situation Analysis	9
a. <i>Overall Assessment</i>	9
b. <i>Facilities and Biosafety</i>	9
c. <i>Laboratory services</i>	10
d. <i>Quality improvement</i>	10
e. <i>Support services</i>	11
V. Proposal	11
a. <i>Overall priorities</i>	11
b. <i>Facilities and biosafety</i>	11
c. <i>Laboratory services</i>	12
d. <i>Quality improvement</i>	12
e. <i>Support services</i>	13
VI. Implementation and Monitoring	14
a. <i>Implementation</i>	14
b. <i>Monitoring</i>	14
VII. Conclusion	15
Appendix 1: Laboratory Summary Matrix	17

Acronyms

ADB	—	Asian Development Bank
AIDS	—	Acquired Immunodeficiency Syndrome
APSED	—	Asia Pacific Strategy for Emerging Diseases
BSL	—	Biosafety Level
CDC	—	Communicable Diseases Control
DHS	—	Department of Hospital Services
EID	—	Emerging Infectious Diseases
EPI	—	Expanded Program Of Immunization
GDPM	—	General Department of Preventive Medicine
GMS	—	Greater Mekong Subregion
HIV	—	Human Immunodeficiency Virus
IHR	—	International Health Regulations
MEV	—	Migrants And Mobile People, Ethnic Minorities, And Other Vulnerable Groups
MOH	—	Ministry of Health
NIHE	—	National Institute of Hygiene and Epidemiology
PMU	—	Project Management Unit
PPMC	—	Provincial Preventive Medicine Centers
QAP	—	Quality Assurance Programs
SARS	—	Severe Acute Respiratory Syndrome
SLMTA	—	Strengthening Laboratory Management Towards Accreditation
SOP	—	Standard Operating Procedures
TB	—	Tuberculosis
WHO	—	World Health Organization

Executive Summary

This report summarizes the assessment of laboratory services for the Greater Mekong Subregion (GMS) Health Security Project (the Project) of Cambodia, Lao PDR, Myanmar, and Viet Nam. It was prepared by the international laboratory quality improvement specialist and team members as part of the project preparation of the Asian Development Bank (ADB).

The Governments of Cambodia, Lao PDR, Myanmar, and Viet Nam have requested the Asian Development Bank (ADB) to support the Greater Mekong Subregion (GMS) Health Security Project (the Project). The Project will focus on regional cooperation and disease control in border areas, strengthening disease surveillance and outbreak response, and improving laboratory services and infection control in hospitals. In Viet Nam, the Ministry of Health (MOH) will be the executing agency. The General Department of Preventive Medicine (GDPM) with help of the Department of Hospital Services, the National Institute of Hygiene and Epidemiology, regional institutions and provincial health offices, will implement the Project in 36 out of 64 provinces (250 districts). A special feature of the Project in Viet Nam is that it will help integrate district preventive medicine and hospital services. Total project costs in Viet Nam are estimated at \$84 million.

Viet Nam, with a population of about 90 million people has made remarkable progress in rapid industrialization which also resulted in major population shifts due to migration. Non-communicable diseases now constitute the major burden of diseases. Even so, communicable diseases remain the major burden for children and the poor, and financing needs to be maintained to keep endemic communicable diseases under control and deal with new challenges. The country had several outbreaks of emerging infectious diseases (EIDs), and has a large burden of tuberculosis and dengue, a residual malaria problem, and a concentrated HIV epidemic. Hospital-based infections and drug resistance are emerging public health problem. All these constitute major public health and economic risks.

While an extensive network of health services is in place, poor people, migrants and ethnic minority groups may not access these services considering access, affordability, acceptability, and quality of care. This situation particularly concerns laboratory services which on paper are quite extensive but face serious staff and other resource concerns. Hence there are gaps in diagnostics for surveillance, prevention, control, and management of infectious diseases, in particular in border areas and industrial zones, which makes it hard to manage health services.

Viet Nam is committed to implement the international health regulations (IHR) and the Asia Pacific Strategy for Emerging Diseases (APSED), and implement regional strategies for the control of major diseases such as dengue, malaria, tuberculosis and HIV/AIDS; and the strengthening of laboratory services. Despite major political commitments and investments including by ADB, access and quality of laboratory services are still insufficient.

One priority area is improving diagnostic capacity for evidence-based decision making. For MOH to have confidence in communicable disease data and to be able to plan and evaluate responses to outbreaks, it require a reliable diagnostic laboratory system staffed by appropriately trained staff working in facilities that are safe for staff and which pose no threat to the community. During this TA, discussions with stakeholders, field visits and document review identified gaps in laboratory services, and priorities for investment under this Project.

Based on the WHO regional plan for strengthening laboratory services, MOH has developed a national laboratory strategy and plan which is being rolled out in phases. Following an initial

focus on upgrading subnational and provincial laboratories, MOH is now planning to integrate and upgrade district laboratory services and strengthen reference centers and training institutions.

The Project will invest in laboratory planning and management, facility repair and biosafety, upgrading district services, in-service training, quality assurance and audit, and the referral system. Risks to be mitigated are the procurement of substandard equipment, inappropriate equipment, facility readiness, staff constraints, adequacy of supplies, and equipment maintenance. The total cost of laboratory investments is estimated at \$30 million.

I. Introduction

a. Assignment

1. To identify gaps in laboratory services within the context of regional public health security, an international laboratory quality improvement consultant, with help of team members, carried out a laboratory review in the 4 countries. As reported, this included (i) a general subsector review to assess strategic approach and progress in laboratory services, (ii) identification of priorities and gaps in laboratory services in the project area, (iii) formulation and cost estimates of interventions, and (iv) identification of implementation risks and arrangements. The sector summary matrix is attached to the CLMV laboratory reports. Equipment details are in the procurement plans.

b. Project Summary

2. Under the GMS economic development program, ADB has been supporting various health projects for communicable diseases control (CDC), HIV, Malaria, and related regional technical assistance.¹ The Governments of Viet Nam, Cambodia, Lao PDR, and Myanmar and ADB have prepared the Project to strengthen national health security systems and regional cooperation for the prevention and control of EIDs and other diseases of regional importance in the GMS, and help countries to comply with IHR 2005 and implement APSED of the WHO.²

3. The proposed project goal is strengthened GMS health security, with as indicators (i) no major outbreak of emerging or other epidemic disease in excess of 100 fatalities, (ii) outbreaks have less than 0.5% impact on GDP in any quarter of the year, and (iii) increased use of public health services in border areas by MEVs. The proposed project outcomes are (i) improved coverage of GMS public health security system and compliance with IHR/APSED and (ii) increased CDC coverage of MEVs in border areas. The proposed project outputs are: (i) improved GMS collaboration and MEV access to CDC in border areas; (ii) strengthened national surveillance and response system; and (iii) improved capacity to diagnose and manage infectious diseases. The proposed project targets 36 provinces (250 districts) in Viet Nam, along the borders and economic corridors with China, Cambodia, and Lao PDR.

4. MOH has made progress with regional information sharing and cross-border cooperation for CDC. However, this needs to be mainstreamed and formalized. In addition, some groups of MEVs that are more likely to get and spread infectious diseases are not using regular health services. Under the first output, the Project (i) supports regional, cross-border, and inter-sectoral information sharing and coordination of outbreak control among GMS countries, (ii) develops regional disease control strategies and evidence-based CDC, and (iii) improves CDC for MEVs along borders and economic corridors in targeted border provinces. Support is needed for joint planning and monitoring; and outreach and community mobilization to reach and engage MEVs.

¹ Including Viet Nam Strengthening Preventive Health System Project; GMS Community Action for HIV Prevention in 2001; GMS Regional Communicable Diseases Control Project in 2004; Second GMS Communicable Diseases Control Project in 2010; GMS Capacity Building for HIV/AIDS Prevention Project in 2012; and technical assistance for SARS, avian influenza, malaria and dengue control, health education, e-Health, and related areas.

² World Health Organization. Asia Pacific Strategy for Emerging Diseases. 2010.

5. MOH has a functioning surveillance system for notifiable diseases in place, and surveillance of HIV, malaria and tuberculosis is strong. However, the system needs to be further computerized and extended to communities by employing syndromic reporting. Linkages or integration among surveillance systems will also be improved. MOH also needs to improve capacity for disease outbreak response. Under the second output, the Project supports (i) syndromic reporting at community level, (ii) web-based reporting including information technology support, (iii) integration of surveillance systems, (iv) risk analysis, communication, and community preparedness, (v) improving capacity of outbreak response teams including transport, and (vi) improving screening and quarantine capacity at border posts of entry and international quarantine centers. Support is needed for system design, computers, training, and vehicles and equipment for outbreak control.

6. District facilities are unable to comply with internationally acceptable levels of biosafety or to guarantee the accuracy of their laboratory testing.. Underlying problems are substandard training of laboratory staff, lack of quality control, and insufficient facilities, equipment, and supplies. The quality assurance system is in a nascent stage, and there is no national laboratory audit system. Nosocomial or hospital-acquired infections are becoming a major public health problem. Under the third output, the Project supports (i) improving quality assurance, (ii) in-service training, (iii) improving district laboratory services, and (iv) equipment and training for infection control and case management of dangerous diseases.

7. In Viet Nam, the Project is estimated to cost \$84 million to be financed by a loan of \$80 million and \$4 million in counterpart funds. MOH is the Executing Agency. GDPM will lead project implementation with support of a project management unit (PMU). DHS, NIHE, subnational institutions, provincial health offices, and 36 provincial preventive medicine centers (PPMC) will assist GDPM with implementation in the 250 districts. The Project will be implemented over a 5-year period beginning early 2017. Project completion date is 30 June 2022.

II. Major public health problems

a. Epidemiology

8. Globally, all countries are at risk of outbreaks of emerging infectious diseases (EIDs). The International Health Regulations (IHR), 2005, of the World Health Organization (WHO) mandates all countries to improve health security against EIDs. The Asia Pacific Strategy for Emerging Disease (APSED), 2010, of the WHO regional offices identifies 10 strategic areas for compliance by not later than 2016. At present, compliance has reached about 70-80% in the region, with specific gaps mainly relating to laboratory services, hospital infection control, and cooperation for outbreak prevention and control with communities, other sectors, and countries.

9. Although the share of the overall burden of disease caused by communicable diseases has declined in Vietnam in recent years, the number of deaths and the burden caused by these diseases remain high in children and the poor. In 2012, infectious diseases caused 86,100 deaths (compared with 97,700 in 2000) and 5.6 million DALYs (compared with 6.7 million in 2000). The following contribute significantly to the burden of communicable diseases:

- Lack of water and sanitation, in particular among the poor
- Some groups not accessing services, in particular ethnic minorities living in mountains
- New threats that may reverse the burden of communicable diseases:
 - Increased drug resistance, particularly in TB, malaria and HIV
 - Industrialization and urbanization with associated migration, slums, and changing lifestyle
 - Reduced compliance with preventive measures like vaccination.
 - Emerging and re-emerging diseases for which control measures are still being developed.

Emerging diseases

10. Vietnam has been identified as a country at high risk of an outbreak of an emerging disease, including one with pandemic potential.

11. In 2003, Vietnam was one of 37 countries affected by the SARS pandemic. In 2004, Vietnam was the first country to record highly pathogenic avian influenza virus in poultry and was one of the countries most severely affected by H5N1 avian influenza with a mortality/morbidity ratio of almost 50% in humans. In 2009, influenza A (H1N1, "swine flu") caused an estimated 12,000 cases and 58 deaths in Vietnam.

Epidemic diseases

12. While Vietnam has had some success in the control and prevention of communicable diseases such as dengue fever; hand, foot and mouth disease; and acute diarrhea; the risk of outbreaks remain.

13. Dengue fever outbreaks occur every year with the peak period from June to December. The incidence of dengue/100 000 population had increased from 32.5 in 2000 to 120 in 2009, and 78 in 2011. Most cases occur in those less than 15 years of age and in the southern provinces of Vietnam.

14. Hand, foot and mouth disease occurs throughout the year but with peaks from March to May and from September to December. In 2011, 112,370 cases and 169 deaths were reported from throughout Vietnam. Sixty per cent of these were from southern Provinces.

15. While there has been overall decline in prevalence of HIV and Tuberculosis, multi-drug resistant forms of HIV and TB infection can spread unless control measures are kept up

Vaccine preventable infectious diseases

16. The incidence and mortality of diseases covered by the expanded program of immunization (EPI) have fallen significantly in recent years. Furthermore, there is not a broad understanding of the importance of herd immunity in preventing outbreaks of communicable diseases. The recent measles outbreaks in Vietnam were a clear example of what can happen when levels of herd immunity are not reached or fall.

17. Surveillance for, and the ability to diagnose, diseases covered by EPI will need to be maintained because the immunization coverage targets have not been achieved for poor children, children living in remote, outlying areas, and children in migrant households.

b. Demand for laboratory services

18. Laboratory services associated with TB, HIV and malaria receive significant financial support from external agencies and so are able to meet much/most of the demand for testing and treatment associated with these diseases. Even with the development of a national Health Insurance System, a significant component of laboratory testing for other communicable diseases is funded by out-of-pocket costs to the patient or their family and so demand is driven by the ability to pay. A significant amount of laboratory testing, particularly that performed on automated analyzers, is unnecessary and is driven by clinicians who are requesting tests to “see if anything shows up”.

19. There is a large, mostly unmet, demand for testing that is of public health importance rather than being critical for the treatment of a patient e.g. testing for vaccine preventable diseases that would provide important information about immunization programs and levels of herd immunity; vector borne diseases like dengue and Japanese encephalitis. The second area of unmet demand is for diseases about which Doctors have little knowledge e.g. Leptospirosis, Brucellosis. One obstacle is high out of pocket costs. If laboratory tests for public health security concerns were free of charge, demand for services would improve.

III. Organization, Policies and Plans

a. Organization

20. There are four parallel diagnostic laboratory systems in Vietnam – the Preventive Medicine and Hospital Laboratory systems under the Ministry of Health, the laboratories under the control of the Ministry of Defense and a private laboratory network. It is anticipated that the Preventive Medicine and Hospital laboratories in the Ministry of Health will be combined beginning with laboratories at the District level in 2016.

21. There is further fragmentation within the diagnostic system with malaria, HIV and tuberculosis often operating within frameworks separate from the main diagnostic one.

22. National Institutes (National Institutes of Hygiene and Epidemiology Hanoi and Tay Nguyen; Pasteur Institutes in Nha Trang and Ho Chi Minh City) provide advanced laboratory diagnostic facilities. The National Institute of Hygiene and Epidemiology in Hanoi and the Institute Pasteur in Ho Chi Minh City are able to diagnose emerging communicable diseases which require BSL III levels of containment. Provincial laboratories and those in large metropolitan hospitals (e.g. Bac Mai Hospital in Hanoi and Children’s Hospitals 1 and 2 in Ho Chi Minh City) have a capacity to diagnose most significant communicable diseases in their catchment areas. Laboratories at the District level (Hospital and Preventive Medicine Centres) have only rudimentary capacity to diagnose communicable diseases and rely, principally, on microscopy (e.g. malaria) and point of care tests (e.g. HIV, dengue, tuberculosis).

b. Policies and Plans

23. At the international and regional levels, Vietnam is a signatory to the International Health Regulations (IHR) the Asia Pacific Strategy for Emerging Diseases (APSED) and also is a signatory to disease specific programs like the Asia Pacific Strategic Plan for Dengue Control,

and similar plans for the control of malaria, tuberculosis, HIV/AIDS, and neglected tropical diseases, and the regional strategy for improving laboratory services. The roles and operation of Ministry of Health laboratories are defined in an extensive series of Decrees and Circulars.³ Many laboratory managers are unfamiliar with this legislation, lack understanding of the legislation, and struggle to use it to guide the operation of laboratories that are safe and able to produce consistently reliable results. *International consultants have found much of the legislation so vague and incomplete as to be unsuitable to drive improvements in Biosafety and Quality.*

24. Joint Annual Health Reviews have found that “The network of preventive medicine facilities at Provincial and District levels is fragmented and lacks linkages for management and provision of services.” In the early stages of the development of a diagnostic Pathology system in Vietnam, priority appears to have been given to developing infrastructure using standard models. Examples of this are seen in the specifications for floor area for particular laboratories (4696/QT-BYT). Vietnam has a large population with diverse demographics spread over a diverse range of geographic and ecological settings and future diagnostic requirements are not going to be the same in all settings or as they are today. The 2013 Joint Annual Health Review of the MOH makes the following observation:

“The organizational structure and regulations on functions and tasks of medical service facilities, especially at the grassroots level are inadequate. Morbidity patterns and health care needs of people have changed over the years, however, the organization, functions and obligations have not been updated”. On average, Preventive Medicine Centers perform only 82 of the 190 tests they are required to be able to perform.

25. Several reports have identified weaknesses in Strategic Planning and in Management of the diagnostic laboratory system in Vietnam. These are likely to delay improvements, impede compliance with international obligations (IHR, APSED) and result in non-optimal service for the sick of Vietnam who pay for laboratory tests. These issues should be addressed immediately and comprehensively *by placing selected MOH staff for extended periods in counterpart organizations, outside Vietnam, recognized for their world best practice.*

c. Progress

26. *Progress in improving laboratory services provided by the Ministry of Health is fragmented and uneven and appears to be proceeding independently of any central leadership from MOH.* More than a dozen laboratories have achieved ISO accreditation and at least two of the National Institutes have laboratories operating at world best practice. *Expertise which exists in National Institutes and a number of Provincial laboratories does not appear to be being utilized in any systematic manner to improve the standard of service throughout the country.*

³ MOH. 2009. *National Laboratory System Strategy Plan To 2020*. MOH. 2010. *Decree 92/2010/NDCP regarding implementation of the Law on Prevention and Control of Infectious Diseases to ensure biosafety in laboratories*. MOH. 2012. *National Technical Regulations on Practice and Biosafety in Laboratories*. MOH. 2012. *Circular 29/2012/TT-BYT regarding Regulations on Certification and Renewal of Biosafety Certification for Biosafety Laboratory*. MOH. 2015. *Planning Framework For Development Of National Preventive Medicine Laboratory System 2016-2020*.

IV. Situation Analysis

a. Overall Assessment

27. The diagnostic laboratory system at the Provincial and District levels in Vietnam is not producing the quantity or quality of data of which it is capable with the resources it has. A number of reviews/reports (e.g. the Joint Annual Health Review) have identified weaknesses in organization and management within MOH and there is little evidence that these are being addressed in any systematic manner in the laboratory system. The GDPM is not utilizing the pool of internationally recognized laboratory specialists it has in its National Institutes, nor exposing its staff to world best practice. Provincial and District Laboratories don't have, don't understand or ignore much of the enormous amount of legislative material covering their operations.

28. Although at least twelve laboratories have achieved ISO 15189 accreditation for all or part of their activities, there is no formal process for auditing of diagnostic laboratories for compliance with quality and safety guidelines. Most diagnostic laboratories do not have standard operating procedures (SOPs) for their activities.

b. Facilities and Biosafety

29. In general, infectious disease laboratories in the National Institutes are safe and produce a reliable product. Many of the staff are familiar with internationally accepted biosafety guidelines and have participated in Quality Assurance programs. Similar conclusions can be drawn about laboratories at the large national hospitals.

30. Many of the Provincial and District laboratories were built before Vietnam had engaged in a systematic manner with international standards of biosafety and quality and so require a significant investment in order to make them safe and fit for purpose and able to meet IHR and APSED requirements. *In previous ADB CDC projects in Vietnam, laboratories had been renovated in a manner not compliant with safety and some equipment supplied was not wanted by the laboratory and or did not fit into the laboratory.* Equipment is not maintained or calibrated in any systematic manner and this is likely to lead to unnecessary breakdowns and unreliable data.

31. Renovations to meet current safety standards have to be funded from Provincial/District budgets and it is not clear whether the Provinces have the funds or the commitment to undertake these improvements. The complexity and lack of clarity in legislation relating to safety and quality make the task of planning any renovations even more difficult.

32. Apart from the internal laboratory processes and facilities, two additional biosafety issues that require attention are the laundry of personal protective equipment e.g. laboratory coats/gowns, and the disposal of laboratory waste. Personal protective equipment should be laundered on site and not taken home for this purpose. The World Bank is developing a program to address the issue of waste management but this issue should be addressed in the short term. Burning and/or burying waste in Hospital or Laboratory grounds is inappropriate.

c. Laboratory services

33. Government legislation stipulates a range of tests to be performed in Provincial or District laboratories without any regard for regional differences in patterns of disease. However, the range and volume of tests performed at each laboratory is determined, largely, by the ability of patients to pay for a diagnostic test and in a survey of Provincial Laboratories, none performed all tests and on average only 82 of the 190 tests legislated were performed. As a result of this pattern of testing, significant data of public health interest is not available until an outbreak is underway e.g vaccine preventable diseases such as measles. Furthermore, there may be a reluctance to refer samples for testing at higher level laboratories if there is an associated cost.

34. There is a significant disconnect between clinicians requesting tests and the laboratory staff performing them. *Many Doctors are unable to interpret laboratory data* and failure of the requesting Doctor to provide even rudimentary patient data like the date of onset of symptoms can result in misdiagnoses and completely inappropriate treatment for the patient. A strong case can be made for joint in-service training of Doctors and laboratory staff.

35. *There is no link between laboratory testing and reporting of Notifiable Diseases* so it is not possible to modify notifiable disease numbers in the light of laboratory testing or even to estimate the accuracy of clinical reporting.

d. Quality improvement

36. The pre-service education and training of laboratory staff is undertaken at a wide range of tertiary institutions. *There is no evidence of systematic engagement between the Ministry of Health and the Ministry of Education and Training* to ensure this pre-service training addresses the priorities of the diagnostic services. This deficiency in the quality of training has been recognized in Joint Annual Health Reports for Vietnam for a number of years.

37. In-service training of laboratory staff is provided, principally, by the National Institutes and international agencies. Identical or related training by international donors is common and it is difficult to find any tangible outcome from many international study visits. *There is no documented program of systematic continuing professional education* that addresses the priorities of the laboratory diagnostic requirements in a strategic manner. There is no assessment of competencies of those completing in-service training when they return from training. The more distant a laboratory is from a large population center, the greater the difficulty experienced hiring and retaining staff. The shortage of staff is a significant constraint in being able to free staff for periods of in-service training.

38. Several of the National Institutes participate in external Quality Assurance programs but, apart from HIV, TB and malaria, *there are no national Quality Assurance Programs* in the communicable disease areas covered by this project. Several laboratories in the National Institutes also participate in External Quality Assurance Programs.

39. Efforts to develop Standard Operating Procedures (SOP) for tests and processes covered by CDC II were unsuccessful. The SOPs produced were not in the format agreed and would not be acceptable in any ISO accredited laboratories. Despite this they were bound into booklets and distributed throughout Vietnam.

40. Efforts to develop a national laboratory audit/assessment system have been unsuccessful.

e. Support services

41. In Viet Nam, public laboratory services are relatively well resourced with an extensive network of facilities and staff. However, management of public laboratory services, and regulation and inspection of private laboratory services, is lacking a central authority in MOH or elsewhere. Current management is fragmented over different government agencies.

42. While there are considerable resource for laboratory services, resource is a major concern. Management of laboratory staff lacks a systematic approach, in particular in terms of maintaining competency. For maintenance of equipment, there are examples of best practice, such a contracting out to the private sector in Hoa Binh province. Facilities are often not suitable and need to be upgraded to comply with biosafety standards. Funding for laboratory consumables remains a major bottleneck affecting demand, quality and biosafety of services.

V. Proposal

a. Overall priorities

43. This project aims to extend the capacity to diagnose selected communicable diseases down to the District level in 36 Provinces bordering China, Laos and Cambodia. The project will attempt to develop the capacity to do this consistently, safely and accurately and to report the results in a timely manner.

b. Facilities and biosafety

44. At the District level, laboratories need to be safe i.e. at a minimum, the building must be weather proof and insect and dog and cat proof, doors and windows must be able to be closed, laboratory space must be separate from offices and eating areas, if procedures are likely to generate aerosols a class II biohazard cabinet should be available. There must be a hand basin at or near the door to the laboratory for hand washing. There must be functional autoclave and laundry facilities to wash personal protective equipment at the laboratory. Each member of the laboratory staff must have a pair of closed shoes for use in the laboratory and two laboratory gowns. There must be safety glasses for each Scientist and disposable gloves for all staff handling potentially infectious material. The laboratory must develop a simple, laboratory-specific, Safety Manual. Each laboratory should be provided with at least two sets of micropipettes and sufficient disposable tips such that there is no requirement for them to be washed and re-used. Efforts should be made for each laboratory to comply with these basic standards, *at the risk of being closed down* if these requirements are not met in view of the public health risk.

45. The initial requests for support from this project included items not related to the project scope of public health security but more to individual patient care for non-communicable diseases. It is recommended that the project focused on relevant equipment even though it agrees with the proposal to combine preventive medicine and hospital laboratory services at district level.

46. Many of the Provincial Laboratories received large amounts of equipment under previous ADB CDC projects. Additional equipment should be provided after the initial visit by the National and International Consultants has confirmed a need. Priority should be given to those items that would contribute significantly to safety or quality.

47. National Laboratories also received a significant amount of equipment under previous ADB CDC projects. Provision of equipment under this project should be linked to a clearly identified *new* capacity. The National and International Laboratory Consultants should provide oversight of requests for equipment and reagents from the District and Provincial Laboratories.

c. Laboratory services

48. The project cannot provide for comprehensive testing for all communicable diseases of regional significance nor for testing of all patients suspected of having a particular infection. Given the spread of laboratories covered by the project, diseases of concern are likely to vary from region to region. Initially, District Laboratories might be supported to test for two infections of local concern using point of care tests. The number of tests supported might be 10 per cent of those reported in the previous year with testing to be completed monthly i.e. each month, they would test a number of patients equivalent to 10 per cent of the average number reported that month for the previous five years. Ongoing provision of tests would be dependent of the results of previous testing being available at the Provincial level and at the Central Epidemiology Unit in Hanoi.

49. Similar prioritization should occur at the Provincial level but with consideration being given to (i) communicable diseases [other than TB, HIV and malaria] of national significance if they also are likely to be responsible for a significant burden of disease in the Province in question, (ii) antimicrobial sensitivity testing on selected bacteria recovered from a cross section of patients (iii) vaccine preventable diseases.

50. The final decision on the diseases for which diagnostic support should be provided at each locality should be made by GDPM in consultation with the National and International Laboratory Consultants.

51. It is critical that procurement packages are prepared in a manner that similar items are combined i.e. point of care tests and bacteriological media should be grouped separately from small or large items of equipment. All tenders should include minimum acceptable levels of sensitivity and specificity for diagnostic tests.

d. Quality improvement

52. This is a very challenging issue given the problems with national safety and quality legislation, discussed above, and a decision by MOH not to put in place a national laboratory audit process. It is not clear how the MOH proposal to involve three or four of the National Institutes in providing Quality assurance/ oversight can be implemented or co-ordinated. Furthermore, it was not clear how much of the equipment requested by the Quality Department at the National Institute of Hygiene and Epidemiology for regional centers would be used to support the Quality process.

53. Given these challenges, the project might support some very simple, inexpensive and uncontroversial quality improvement processes. The first step in Quality improvement should be the development of Standard Operating Procedures (SOP) for the tests and processes associated with this project. Previous experience with the Training Units in National Institutes, suggests this should be undertaken by the project Consultants as part of training Workshops for laboratory staff. There would be value in engaging Scientists from the National Institutes who have experience with ISO laboratory standards to assist with these workshops. The SOP template developed for in Vietnam for CDC II would be appropriate as would that developed under CDC II in Lao PDR.

54. The training Workshops (above), conducted by the National and International Consultants with the support of Scientists with first hand experience of safety and quality processes in Vietnamese laboratories also should provide a theoretical background to the diseases of interest (including case definitions) and the methods for their diagnosis, At least half the time in the workshops should be spent in a laboratory refining laboratory skills. Key skills include the ability to use personal protective equipment correctly, to operate, clean and calibrate micropipettes correctly, the ability to conduct a diagnostic test correctly when following an SOP and the ability to interpret and report laboratory test results correctly. Both the knowledge and laboratory competencies should be assessed formally at the conclusion of the Workshop.

55. The National Institutes should be funded to participate in a small number of international External Quality Assurance Programs (QAP) for diagnostic tests related to this project. When they have demonstrated competence, they should establish QAPs for these tests within this project. If assembling and distributing panels for testing is not possible at the beginning of the project, a system for referring a small number of positive, negative and equivocal samples back to the National Institutes should be developed. This could be linked to the improved system being developed for the systematic referral of sampled from District to Province and from Province to National Institutes.

56. The project, with or without support from WHO, should translate the Strengthening Laboratory Management Towards Accreditation (SLMTA) documentation into Vietnamese and distribute it to all project laboratories.

57. The National and International Consultants should visit each Provincial Laboratory and one District Laboratory in each Province once each year to assess the state of safety and quality in each and to attempt to provide corrective actions for any local laboratory problems.

e. Support services

58. MOH should recognize the management requirements of the laboratory subsector, being technically complex, and requiring up to 20 different functions to be in place to provide acceptable laboratory services. MOH may want to consider clarifying leadership and roles and responsibilities for the subsector and set up/improve coordination mechanisms, and agree on level of services, specialized services, guidelines, SOPs and other matters to arrive at a comprehensive and well-planned laboratory system.

59. MOH is developing/ has developed the capacity to test class II biohazard cabinets. If this capacity has been developed, it should be employed to certify the operation of all class II biohazard cabinets used by the project on an annual basis. Reportedly, MOH has put a team together to calibrate cabinets on a yearly basis. Maintenance of other equipment may be combined in suitable packages and contracted out. Private maintenance firms are available in HMCC and Hanoi.

60. There is a major risk of procurement of substandard laboratory equipment, as specifications are often not good enough to avoid poor quality equipment. The National and International Consultants should support the procurement process by assisting in the preparation of specifications for all laboratory equipment and supplies.

VI. Implementation and Monitoring

a. Implementation

61. The National and International Consultants should visit all Provincial Laboratories covered by the project and at least one District Laboratory in each Province as soon as possible after the commencement of the project and before significant procurement is undertaken. Visits to Provincial laboratories should take no more than 2-3 hours and each District laboratory no more than an hour. The visit should identify any critical safety issues that require immediate attention – either minor modifications to the facility (e.g. the provision of an hand basin; replacement of a ceiling fan with an air conditioner) or the purchase of critical items of equipment (e.g. an autoclave). The visit also should assess the need for basic items like personal protective equipment, micropipettes, disposable tips and a top-loading balance to calibrate the pipettes.

62. These initial visits should include an evaluation of where any proposed new equipment will be sited and whether it will fit through existing doorways and access points. Staff also should be asked to provide an estimate of what volume of work the new equipment will perform.

63. The provision of initial supplies from the project to District laboratories should coincide with training workshops for one staff member from each of those laboratories in the Province. Given staffing constraints in many District Laboratories, it may be appropriate to conduct these workshops Friday-Saturday-Sunday-Monday to minimize time away from the laboratory. Wherever possible, travel time for Laboratory staff to attend workshops should be minimized.

b. Monitoring

64. After the implementation visit, Consultants should make systematic annual visits to as many laboratories as possible. Priority should be attached to visiting all laboratories in those Provinces where the previous visit identified the most problems and where laboratories have performed poorly in EQA programs. Subsequent visits should assess how much of the training at Workshops is implemented when Scientists return to their home laboratory. If implementation is poor, the cause should be identified and corrective action taken in subsequent Workshops if possible. The visits also should record if all diagnostic material has been delivered, delivered in

a timely manner, whether it has been used as designated and whether the results of the testing have been recorded in an appropriate manner i.e. is all data traceable?

65. These visits should record when project equipment is delivered, how long it takes to become operational and what the volume of testing with each is.

66. In addition to monitoring laboratory activities, these annual visits should determine what use is made of the laboratory test results e.g. only for patient treatment; reported to the Province; led to an outbreak response etc.

VII. Conclusion

67. Several reports have identified weaknesses in Strategic Planning and in Management of the diagnostic laboratory system in Vietnam. Progress in improving laboratory appears to be proceeding independently of MOH leadership. This impedes compliance with international obligations (IHR, APSED) and result in non-optimal service for the sick of Vietnam who pay for laboratory tests.

68. For Ministries of Health to have confidence in their communicable disease data and to be able to plan and evaluate responses to outbreaks, they require a reliable diagnostic laboratory system staffed by appropriately trained staff working in facilities that are safe for staff and which pose no threat to the community. However, the diagnostic laboratory system at the Provincial and District levels in Vietnam is not producing the quantity or quality of data of which it is capable with the resources it has. The GDPM is not utilizing the pool of internationally recognized laboratory specialists it has in its National Institutes, nor exposing its staff to world best practice.

69. Although at least twelve laboratories have achieved ISO 15189 accreditation for all or part of their activities, there is no formal process for auditing of diagnostic laboratories for compliance with quality and safety guidelines. Most diagnostic laboratories do not have standard operating procedures (SOPs) for their activities.

70. Many of the Provincial and District laboratories were built before Vietnam had engaged in a systematic manner with international standards of biosafety and quality and so require a significant investment in order to make them safe and fit for purpose and able to meet IHR and APSED requirements. Equipment is not maintained or calibrated in any systematic manner and this is likely to lead to unnecessary breakdowns and unreliable data.

71. Provincial Laboratories performed on average only 82 of the 190 tests. Many Doctors are unable to interpret laboratory data. There is no link between laboratory testing and reporting of Notifiable Diseases so it is not possible to modify notifiable disease numbers in the light of laboratory testing or even to estimate the accuracy of clinical reporting.

72. There is no evidence of systematic engagement between the Ministry of Health and the Ministry of Education and Training. In-service training of laboratory staff is provided, principally, by the National Institutes and international agencies. Identical or related training by international

donors is common and it is difficult to find any tangible outcome from many international study visits.

73. Apart from HIV, TB and malaria, there are no national Quality Assurance Programs in the communicable disease areas covered by this project. Efforts to develop Standard Operating Procedures (SOP) for tests and processes covered by earlier projects were unsuccessful.

74. This project aims to extend the capacity to diagnose selected communicable diseases down to the District level in 36 Provinces bordering China, Laos and Cambodia. The project will attempt to develop the capacity to do this consistently, safely and accurately and to report the results in a timely manner. Efforts should be made for each laboratory to comply with basic standards, at the risk of being closed down if these requirements are not met in view of the public health risk.

75. The project is proposed to support some very simple, inexpensive and uncontroversial quality improvement processes. The first step in Quality improvement should be the development of Standard Operating Procedures (SOP) for the tests and processes associated with this project. Training Workshops should provide a theoretical background to the diseases of interest (including case definitions) and the methods for their diagnosis, At least half the time in the workshops should be spent in a laboratory refining laboratory skills. The project, with or without support from WHO, should translate the Strengthening Laboratory Management Towards Accreditation (SLMTA) documentation into Vietnamese and distribute it to all project laboratories. The Project will also support regional laboratories to develop referral and quality assurance/audit services.

76. There is a major risk of procurement of substandard laboratory equipment, as specifications are often not good enough to avoid poor quality equipment. The National and International Consultants should support the procurement process by assisting in the preparation of specifications for all laboratory equipment and supplies.

Appendix 1: Laboratory Summary Matrix

Appendix 1: Laboratory Summary Matrix
GMS Health Security: Laboratory Summary Assessment

A. GMS LABORATORY SERVICES SUMMARY				
Laboratory Services	Cambodia	Lao PDR	Myanmar	Viet Nam
1. National and Subnational Laboratories and Referral Abroad				
<i>Name of national laboratories</i>	National Institute of Public Health NIPH	National Centre for Laboratories and Epidemiology NCLE	National Health Laboratory NHL	National Institute of Hygiene and Epidemiology NIHE
<i>CDC/EID Function/Services</i>	Diagnostic tests up to BSL2+, quality control	BLS2+. Biological blood analysis, PCR (Elisa, vibro, cury-bacterian, Ecoli.) culture. Serology, Molecular, cell culture for influenza.	BSL2+, training, some research, quality control. Expanding range of pathology tests to improve surveillance	Diagnostic tests up to BSL3, vaccine production, training, research, quality control
<i>Key Issues</i>	Capacity for antibiotic sensitivity testing (AST)	Lacking of GoL budget support for reagent and supply	Major staff constraints, outdated facility and equipment	Lack of laboratory space
<i>Names of specialized CDC/EID hospitals with lab</i>	All major tertiary hospitals in Phnom Penh, Calmette hospital, Pasteur	5 centrals hospital: Mahosot, Friendship, Setha, 103, 5Mesa, MCH and Pediatric	National Hospital Yangon Regional Hospital Nay Pyi Taw, Regional Hospital Mandalay Department of Medical Research	Bach Mai Infectious Diseases Hospital, Hanoi, all major tertiary hospitals in Hanoi and HCMC
<i>CDC/EID Function/Services</i>	Disease control and patient care	Serology, biological blood analysis, PCR and UTI	Care of infectious patients, diagnoses	EIDs and other infectious diseases
<i>Key Issues</i>		Standard serology and biological no culture	Overlapping CDC roles, overlapping surveillance systems, low immunization quality needs surveillance	
<i>Names of other public CDC labs/research institutions</i>	NCHADS, NCTB, NCPEMC	CHASS, NCTBC, CNMEP	NPT/Mandalay laboratories NHAP, NTP, NMP	VAAC, NTBI, NIMPE, NIHE,
<i>CDC/EID</i>	Linked to specific	CPME – malaria,	For TB/HIV/malaria	For TB/HIV/malaria

<i>Function/Services</i>	technical needs of the National Programs including Dengue, TB, malaria, HIV/AIDS programs	parasite intestinal and PCR TB – sputum and blood FDD – food borne disease and chemical product Dermatology Center	programs	programs
<i>Key Issues</i>	Coordination	Specialist lab for each purpose. costly than hospital	Roles need to be more clearly defined, reporting	Coordination and reporting
<i>Names of other institutes involved in EID/CDC</i>		Military lab for malaria at Phontong	Military (<i>Tattmadaw</i>)	Military
<i>Key Issues</i>			No coordination/reporting	
<i>Names of major research labs</i>	Institute Pasteur in Cambodia	Institute Pasteur Mérieux	Institute Pasteur is linked to NHL	NIHE, IP Nha Trang IP HCMC
<i>Function/Services</i>	Biomedical research and surveillance of infectious diseases, platform for comprehensive medical and biological analyses unique in Cambodia, international vaccination center	Completed serology test and research study		Biomedical research and surveillance of infectious diseases
<i>Key CDC/EID Issues</i>		Research purpose major		
<i>Global/Regional referral labs for the country</i>	France, USA, Japan, Australia	France, Denmark, England, New Zealand, Greece, USA, Japan	UK, France, Japan, Korea, USA	USA, France, Japan, Australia
<i>Function/Services</i>		IQA/ EQA		
2. Regional Laboratories				
<i>Names</i>		Luangphabang, Military 107, ODX, SVK and CPS	NPT, Mandalay	Pasteur Institutes in HCMC, Nha Trang, Central Highlands
<i>Function/Services</i>		biology and serology, some culture in for research study only	Referral laboratories	Infectious diseases control

<i>Key CDC/EID Issues</i>			Role in outbreak response not clear vis-à-vis NHL	
3. Provincial/State laboratories				
<i>Number</i>	25	17 provincial hospital lab	15	64
<i>Function/Services</i>	CPA guidelines: “provision of high quality service in medical analysis responsive to the need for diagnosis which are all necessarily pertinent to general medical and surgery services in a referral hospital”	biology and serology	Referral laboratories – general diagnostics including histology and microbiology.	General hospital laboratories for patient diagnostics Provincial medicine laboratories for infectious diseases control, food safety and screening for NCDs
<i>Key CDC/EID Issues</i>	Different capacities	Some provinces have army laboratory	New an appropriate equipment provided to state laboratories, however there is lack of capable staff and 2 state laboratories do not have a pathologist. Not clear who is responsible for laboratory services for outbreak response	High workload of provincial laboratories
4. District laboratories				
<i>Number</i>	92 referral hospitals with laboratory services based on the levels of CPA (1-3) with 1 is the lowest.	148 district laboratories	48 district hospitals	All district hospitals in 64 provinces
<i>Function/Services</i>	Id. To provincial lab	Biological and serological analysis	Hematology, parasitology, biochemistry, urine analysis	Hematology, parasitology, biochemistry, urine analysis
<i>Key CDC/EID Issues</i>	Different capacities	Basic analysis with para-		

		biological machine		
5. Community/township laboratories				
<i>Types and Number</i>	N/A	768 HC lab with RDT & microscopic 4 Community lab.	324 Small lab, not including some labs in station hospitals	One-person lab
<i>Function/Services</i>	Sometimes rapid test for TB, HIV, malaria, dengue	basic analysis using para biological machine	Microscopy for malaria, TB, rapid test for malaria, TB, HIV if supplies available	Microscopy for malaria, TB, sometimes rapid test for HIV, dengue
<i>Key CDC/EID Issues</i>		Lacking of lab staff		No proper facility
6. Private laboratories				
<i>Types and Number</i>	In all urban locations and some rural locations, probably over 3,000	All 1,044 private clinic and 16 private hospital have their own lab	In major cities and towns	Over 10,000 private labs either in clinics or separate
<i>Function/Services</i>	Patient diagnostics	Lab for diagnostic	Patient care	Patient diagnostics, no public health reporting unless for notifiable diseases
<i>Key Public CDC/EID Issues</i>	No license, no inspection	Many private clinic got license from MoIC and under MoH	Reporting to health department	Insufficient inspection
7. Training institutions for laboratory staff				
<i>Number of Universities</i>		University of Health Science	University of Yangon and Mandalay	
<i>Course/duration/intake</i>		6 years	Bachelor of Medical Technology, 4 years, to be operated by MOE in 1 year	
<i>Key Issues</i>			Not enough skill training, Need to improve biosafety of teaching labs, and provide new equipment, test kits and micropipettes	
<i>Number of Colleges</i>		Faculty of Medical Technology		
<i>Course/duration/intake</i>		4 years course		

		(bachelor) 3 years course(semi-bachelor) in SVK		
<i>Key Issues</i>		After MA they can continue study in Medical science technology		
Number of Schools	One Technical School for Medical Care (TSMC) in Phnom Penh	SVK, CPS and LPB	Laboratory technician operated by MOH	
<i>Course/duration/intake</i>	3 years	1,6 years course	1 year	
<i>Key Issues</i>			Insufficient training to work independently in field lab	
8. Blood banks				
<i>Key Issues relating to EID</i>	To define clear linkage with EID (e.g. antimicrobial resistance, infection prevention and control)	National Lao Blood banks under Lao Red Cross scan for HIV, Malaria and STD		

B. GMS LABORATORY SYSTEMS SUMMARY				
System features and performance	Cambodia	Lao PDR	Myanmar	Viet Nam
Strategic Element 1: Developing an operating framework for improving laboratory services				
1. Legal Framework				
<i>Laboratory services policy/strategy for CDC/EID in place?</i>	Yes	Yes	Draft Laboratory Plan	Yes
<i>Legal frameworks for laboratory services quality and biosafety?</i>	Yes	Operational Guideline for Health Lab Network in Laos	No biosafety legislation	Yes
<i>Legal framework for private laboratory services for CDC/EID?</i>	In process	Yes, but could not control	No	Yes

<i>Legal framework for laboratory accreditation and audit?</i>	In process, for 25 sites for national and provincial levels	Yes	No	Yes
<i>Other major legal frameworks of relevance to CDC/EID labs?</i>	Relevance for CDC laws	National strategy CDC lab No. 165 in 2014		
2. Organization				
<i>List MOH Departments managing laboratory services?</i>	Department of Medical Services (Bureau of Medical Laboratory Services)	DHS, HCD, FDD, CDC and Training Dept.	Department of Hospital Services	General Department of Preventive Medicines, Viet Nam Administration of Medical Services
<i>Is there one MOH department overall in charge of lab services?</i>	Yes	No	No	No
<i>Are laboratory services headed by DG or DDG?</i>	No	No	No	No
<i>Is there an active and effective planning structure?</i>	Annual Operational Plan (AOP) development	AOP	AOP	AOP
<i>Is there an active and effective national coordinating committee?</i>	Yes (Sub-technical Working Group on Blood Safety and Laboratory Services: SWGBSLS))	Yes, Dr Phengta Vongphachanh	Yes	Yes
<i>Is there an active and effective technical workgroup/taskforce?</i>	SWGBSLS	Yes, including 16 members	Yes	Yes
<i>Other issues?</i>		Twice meeting a year		
3. Planning, Management, Monitoring				
<i>Is there a comprehensive laboratory development program?</i>	Yes, through the Nat Strategy for Medical Laboratory Services 2015-2020	Yes		Separate for GDPM but now being integrated
<i>Is a laboratory five year plan and budget approved?</i>	No costed plan	Yes		Separate plans
<i>Are laboratory services financed through annual</i>	Yes	No, sometime get sometime no	Yes	Yes

<i>plans?</i>				
<i>Are lab management /SOPs in place?</i>	Yes	Yes		
<i>Is the laboratory management information system functioning?</i>	Early stage of development, need more logistic support	Not effect to all		
<i>Is there a functioning central lab database system?</i>	To be finalized by the end of 2015	Some time and rarely updated		
<i>Is there monthly reporting to the national oversight agency?</i>	Yes	Yes		
<i>Is action taken based on reported performance of laboratories?</i>	Yes, partially	Some time		
<i>Other issues?</i>				
4. Financing				
<i>Is the annual laboratory budget received in time and sufficient?</i>	Not sufficient	Not on time and not sufficient	Cash flow problems	
<i>If not, what is typically being cut/skipped?</i>	Biosafety, Lab information system, maintenance	Always reagent and equipment	Supplies	Supplies
<i>What % of laboratory budget allocations can be spent annually?</i>	Around 14% in 2015	80%		
<i>What % of the non-salary recurrent budget for laboratory services is financed (i) by government, (ii) by donors, (iii) out of pocket?</i>	Donor support usually in kind, through trainings	23% government 39% donor 38% Out of pocket and other		
<i>Who decides how to spend laboratory allocations?</i>	MOH Management (Minister)	Steering committee	Director	Head of Laboratory
<i>Are sources used in a balanced manner and used efficiently?</i>	Rationalized through the Sub-technical working group on blood safety and	No	Yes	Yes

	laboratory services			
<i>Other issues?</i>				
Strategic Element 2: Reforming and integrating laboratory services				
1. Leadership				
<i>Is there proof of strong leadership and commitment to evidence based decision making including better use of laboratory services?</i>	Yes, National Strategy for Medical Laboratory Services 2015-2020	They said Yes	Yes	Not sure
<i>Is there strong advocacy of senior management on importance of improving quality and biosafety of lab services?</i>	Yes	Not sure	Yes	Yes
<i>Is government committed to sustain laboratory financing?</i>	Yes	No	Yes	Yes
<i>Is government considering contracting out to the private sector?</i>	No	No	No	No
<i>Other issues?</i>	Budget constraint			
2. Strategic Planning				
<i>Is there clear guidance on standards of laboratory services?</i>	yes	Yes	Some	Yes
<i>Are standards based on burden of diseases and expected demand?</i>	Yes, geared towards IHR/APSED	yes	No	Yes
<i>Which laboratories are often seriously underused?</i>	Need more training for improved use by clinicians	Don't have yet	Small laboratories	District Preventive health center laboratories
<i>What mainly explains low demand for lab services, low public demand, private sector competition, limited range</i>	Lab services underused by clinicians	Limited range of diagnostics, lack of staff and limited opening hours	Lack of staff an supply	Low demand for services

<i>of diagnostics, lack of staff, poor quality, limited opening hours?</i>				
<i>Are there mechanisms to rationalize laboratory services?</i>	Yes, through QMS, QA, Biosafety, SOP standards	Yes	Not yet	Plan to integrate district preventive and hospital laboratories
<i>Are there plans to adjust laboratory services to make these more effective and efficient?</i>	Training based on real life situation when an unknown health event occurs → rapid response team, lab, infection control and clinicians working together)	In 5 year plan (2016-20) has several point for improving their services	Build capacity of NPT and Mandalay laboratories to reduce work of NHL	As above
<i>Other issues?</i>				
3. Coordination				
<i>Are roles of various national laboratories clear?</i>	Yes (TORs)	Yes	No	Yes
<i>Are roles clear between levels of laboratory services?</i>	Yes (CPA guidelines)	Yes	No	Yes
<i>Is a specimen referral system in place?</i>	Yes, as specified in Quality Manual	Yes	Weak	Yes
<i>Are there formal links with clinical services?</i>	Yes, in lab with QMS	Yes	Yes	Yes
<i>Is there a regional/global referral for difficult diagnostics?</i>	Yes through IATA, ICAO	Yes	Yes	Yes
<i>Is there a move towards (de)centralized laboratory services?</i>	CPA guidelines: Lab only available at district level	Yes	Yes	No, need to centralize to make more efficient
<i>Are there efforts for horizontal integration of laboratory services – curative and preventive?</i>	Yes, through CAMLIS	Yes, system in place not sufficient fund support	Being discussed	Yes, as above
<i>Is there a move towards integration with the private sector/contracting</i>	No	No	No	No

<i>out?</i>				
<i>Are there formal links with other laboratories such as for animal health, water quality and food product inspection?</i>	Yes, especially with the Ministry of Agriculture (NaVRI)	Yes Quarterly meeting	?	Yes
<i>Has mapping of stakeholders of lab services been done?</i>	Yes, by the MOH Bureau of Medical Laboratory Services (BMLS)	yes	No	No
<i>Is there effort to improve networking at local, national, regional and international levels for sharing experience and resources?</i>	Yes	In process with international, regularly with local, national and regional	No	No
<i>Is there a coordinating body to create collaboration among partners at local, national, regional and international levels?</i>	Yes, through the Sub-technical working group for blood safety and laboratory services	Yes	No	No
<i>Are GMS countries supporting each other for EID diagnostics</i>	Yes	Yes	Yes	Yes
<i>Other issues?</i>				
4. Evaluation				
<i>Latest comprehensive Lab assessments?</i>	2013- 2014- 2015	5 provinces under EU 2013, 12 provinces under ADB in 2014		
<i>Latest national lab review?</i>	2015 (Nat Strategy 2010-2015→2015-2020)	July 2014		
<i>Is annual plan assessed each year?</i>	Yes, every January	Yes	?	?
<i>Are regular internal laboratory discussions required?</i>	Yes, through sub-technical working groups at all sites with microbiology	Yes	?	?
<i>Are regular laboratory discussions with clinicians</i>	Yes	Yes	?	?

<i>required?</i>				
<i>Are special studies done like fever study, immunization study to assess effectiveness of disease control programs?</i>	Yes, Fever study with NAMRU	Yes	Proposed	Proposed
<i>Is information used efficiently to improve lab services?</i>	Yes, Cambodia Laboratory information system (CAMLIS) under development to support CAMEWARN and anti-microbial resistance (AMR) effort	Yes	No	No
<i>Are there periodic evaluations to measure the degree to which individual laboratories have implemented recommended changes?</i>	Yes, but irregular	Yes, by WHO technician support in NCLE	WHO	WHO
<i>Other issues?</i>	Budget constraint, not enough supervision		Budget constraint	

Strategic Element 3: Improving Biosafety of Laboratories

<i>Are Biosafety SOPs available?</i>	yes	Yes	No	Yes
<i>Is there regular assessment of all aspects of biosafety?</i>	First assessment in 2015	One a year	No	Yes
<i>Do facilities use biosafety score cards and plan for improvement?</i>	Yes	Yes	No, new hospitals are not compliant with international biosafety standards and need modifications	Yes
<i>List any major biosafety system problems?</i>	No standard BSC, no financial resource for decontamination		Lack of funds, lack of biosafety guideline	
<i>Does every lab has an</i>	Yes, for national referral lab	Yes	Yes	Yes

<i>appointed biosafety person?</i>	& sites with microbiology			
<i>Are in charges of laboratories specially trained in biosafety?</i>	yes	Yes	Yes	Yes
<i>Is there a national training program for biosafety?</i>	No formal curriculum, only short courses ToT from Singapore TA for curriculum development needed	Yes	No	Yes
<i>What proportion of staff is trained/qualifies in biosafety?</i>	All lab staffs at sites with microbiology	100%at national level		All in charges
<i>Are there national standards for design of lab facilities for biosafety including for liquid and solid waste management?</i>	yes	Yes	WHO standards	Yes
<i>What are the main facility problems for biosafety in provincial and district laboratories such as lack of space, facility design, waste management, etc?</i>	No standard	In some province no space for waste management and many district depend on facility design	Outdated facilities, not using protective clothing, improper handling of waste by untrained persons	Waste management
<i>Are there national standards for biosafety equipment of laboratories?</i>	No, TA needed	yes	No	Yes
<i>What are the main equipment shortages for biosafety in labs?</i>	Backup electricity, BSC spare parts	Drainage waste water use the same main drainage	Incinerators	Waste management equipment
<i>Which consumables are mostly out of stock for biosafety?</i>	Not sufficient	Coach, shoe and hand washing liquid	Basic cleaning supplies	Detergents, gloves, brushes, etc.
<i>Other issues?</i>	No budget to certify, not			

	enough training and supervision			
Strategic Element 4: Improving Quality of Laboratory Services				
<i>What hard data are available on lab quality problems?</i>	IQC needed to get data on lab quality			
<i>What are the common problems in quality of lab services?</i>	Levy Jennings Charts	Lack of reagent at national level and at provincial and district lack of clean water supply	Lack of calibration, staff skills, supplies, lack of minor equipment	Staff skills
<i>How does MOH show commitment to address these problems?</i>	Refresher trainings, labs to record data and take corrective actions	Some problems were solved and some could not yet		
<i>Are quality objectives clearly defined and documented?</i>	Yes, in CPA guidelines	Not all were recorded	No	Yes
<i>Is the lab QI design clear and understood within MOH?</i>	Yes, as stated in the national strategic plan 2015-2020	Yes		Not sure
<i>For which levels is a quality improvement plan being rolled out?</i>	National referral labs & CPA3+microbiology labs	Central and provinces	Central	Provinces
<i>Are protocols and SOPs available for IQC?</i>	Yes	Yes	no	Yes
<i>Are protocols and SOPs for IQC available on line?</i>	Not yet, to be synchronized to become standard	No	no	
<i>What % of labs has satisfactory IQC > 50%, 80% in 2014?</i>	2015: 44% for biochemistry 61% for hematology	80%		
<i>What are the major issues in implementing IQC?</i>	Trainings, support reagents	Long time of transport specimen		
<i>What % of labs were examined in external quality assurance?</i>	31 out of 89 labs (34%)	5%	HIV QA done, but not available in visited labs NHL does periodic QA	
<i>What % of examined labs</i>	2014: Bacterio: 100%	85%		

<i>has satisfactory EQA> 50%, 80%?</i>	Serology: 100% Hemato: 49% Biochemistry: 74%			
<i>What are the major issues in implementing EQA?</i>	Refresher trainings; follow up	High cost of transport and fee		
<i>What % of labs are ISO certified at what level</i>	Not yet	90% WHO		NIHE: nil Provincial level: 25%
<i>Is there a laboratory audit system in place up to what level</i>	Internal: working group External: not yet available	Yes for basic	No audit system in place	No
<i>Is laboratory registration and accreditation required for public and private laboratory services</i>	Yes	Yes in rule not all practices	Yes	Yes but not in practice
<i>Is there a registration and accreditation agency</i>	MOH Department of Hospital Services (mostly registration)	Yes	Department of Hospital Services	VAMS
<i>What % of private laboratories are registered and accredited?</i>		25%		
<i>Other issues?</i>	Improve private sector, QMS, Bio-safety			

Strategic Element 5: Improving Laboratory Resources

1. Staff

<i>Is there an approved HRD plan for laboratory services?</i>	Yes. The national Examination. For 2015, a total of 1,030 lab technicians trained. MOH intake:18 among all the 433 staffs approved by the Government	Yes	No	Yes
<i>Is there a personnel management system for lab staff?</i>	Yes	Yes	No	Part of general system
<i>What are the major documented issues in</i>	Lack of staff at lower level	lack of staff at lower level, lack of lab	Lack of qualified staff at lower level	Staff constraints at lower level

<i>HRD in laboratory services, e.g., lack of lab managers, lack of staff at lower level, shortage of specific cadres, staff drain to private sector, staff motivation, lack of career opportunity, low pay, staff quality?</i>		managers, low pay, staff quality		
What are MOH priorities to be addressed?	Staff quality/quantity as per CPA guidelines (CPA1: 3; CPA2:3-5; CPA3: 6-8)	Improve staff quality at low level	Staff quality	Staff quality
<i>Other issues?</i>				

2. Pre-service Education

<i>Is there coordination with MOE on standard curriculums?</i>	Yes, for curriculum update	Yes but school is under MOH	Yes, higher level training done by MOE, lower level by MOH	
<i>How many students enter lab studies annually all levels?</i>	2015: 18 lab staffs/MOH total 433)	70 to 100		
<i>Do students have sufficient basic science preparation?</i>	Insufficient	Insufficient	Insufficient	Insufficient
<i>Are there major shortages of staff, facilities, equipment, supplies?</i>	Yes	shortages of facilities, equipment, supplies	Yes	No
<i>Are exams serious and rigorous?</i>	No, support by JICA, US CDC, but not strict	Not all, some	Yes	Yes
<i>Are government positions available after graduation?</i>	18/433 (2015)	Not all student, many position available in province and district; student not prefer to go far from home	Yes	Yes
<i>Are schools certified and inspected annually?</i>	Yes, but irregular	Yes	No	No
<i>Other issues?</i>				

3. In-service Training

<i>Is in-service training ad hoc driven or follows agreed annual plan?</i>	both	Some		
<i>Average staff training per year as % of total staff?</i>	In 2013-2014: 120 lab staff trained in bio-safety; 2015: 15 staff each trained on hemato & bio-chemistry (July 2015: MOH staff=20,811 with 491 secondary lab staff and 72 primary lab staff)	3%		
<i>Mostly class room or practical training?</i>	both	Yes		
<i>What % of labs have NGO partnership or mentoring?</i>	Specific to NGO area of support	30%		
<i>Are there on-line training programs?</i>	no	No		
<i>Other issues?</i>		At NCLE has on job train by WHO lab technical staff other lab no		
4. Equipment				
<i>Is there a standard essential equipment for each level?</i>		Yes	Yes	
<i>What are common equipment items lacking in many laboratories?</i>		Central level not many thing In province still have	Most items available	
<i>What are common reasons for low use of equipment?</i>		Not existing of how often used Check for using purpose	Lack of skilled staff	
<i>Are purchased equipments often of substandard quality?</i>		Yes, often	No, purchased equipment is appropriate	
<i>How can the procurement of quality equipment be</i>		Procurement based on specification	Maintain technical selection committee	

<i>assured?</i>				
<i>Is there a system for equipment maintenance and calibration?</i>		Yes	Centralized, needs training of staff to do their own calibration	Yes, maintenance contracted out for some equipment, and team goes round to calibrate biosafety cabinets
<i>Is equipment being leased?</i>	No	No, not leased	No	No
<i>Are there qualified staff trained in preventive maintenance?</i>		Based on SOPs after trained	Yes but few	
<i>Are there SOPs for maintenance and calibration?</i>		Yes	Yes but not widely used	
<i>Other issues?</i>				
5. Supplies				
<i>Is there a standard list of supplies for various levels of labs?</i>	Yes (standard tests for each CPA level)	Yes, for EU project and some ADB	Yes	
<i>Which are the major stock outs for laboratory services – reagents, glassware, PPE, rapid tests?</i>	Mostly reagents to run IQC tests	Some stock out of PPE in province, NCLE stock out of some reagents		
<i>Is there a national stock keeping system for lab supplies?</i>	Yes, at Central Medical Store	No		
<i>Are lab supplies purchased directly from the private sector?</i>	Centrally procured if from MOH, direct purchase if from HEF	Depend on project procurement		
<i>Are lab supplies mainly paid from patient fees?</i>	About 70% covered by MOH	No		
<i>Are supplies properly stored?</i>	Yes	Yes		
<i>How are supplies disposed of if out of date?</i>	N/A: Supplies are to be used before expiry date	Specimen for training		
<i>% need covered for rapid</i>	Dengue: 100 tests/year	90%		

<i>tests for malaria, HIV, TB, and dengue?</i>				
<i>Are particular tests missing?</i>	Dengue	Provincial level assessment needs		
<i>Other issues?</i>				
6. Technical assistance				
<i>Agencies providing major funding</i>	WHO, DMDP (Developing Microbiology Diagnostic Program), Mérieux Foundation, USCD, NAMRU2	ADB, EU, WHO, CDC(USAID)		
<i>Agencies providing technical support</i>	WHO, DMDP, TLL (Temasek Life science Laboratory), AFRIMS	EU, ADB, WHO, CDC(USAID) NIED(Japan)		
<i>Are there NGOs/INGOs/experts providing mentoring</i>	US CDC, ITECH, DMDP,	5 TA		
<i>Are lab staffs regularly engaged in technical associations, networks, community of practice?</i>	Newly created Lab Association (Chair: Pharm. Ket Vansith)	Yes		
<i>Are lab staffs regularly exposed to workshops, formal meetings, professional discussions, web sites?</i>	Yes	Yes		
<i>Other issues?</i>	Coordination/synchronization			

C. GMS PUBLIC LABORATORY ASSESSMENT SUMMARY

Equipment and Supplies	Cambodia	Lao PDR	Myanmar	Viet Nam
National/Regional Public Health Laboratories (add any other major lab if this is a MOH priority)				
<i>List major items of equipment not available, not functioning, or old.</i>		Inventory list a NCLE Provincial level some existed list		

<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Zika virus		
<i>List gaps in staffing.</i>				
<i>List safety equipment (e.g. washing machine, autoclave, PPE, not available, not operational or old.</i>		NCLE- autoclave Province- autoclave needs for more purpose use at least two per each lab		
<i>List safety supplies in short supply incl PPE, gowns.</i>				
Regional/State, Provincial, and District Laboratories, (select questions as applicable, sample range of facilities)				
1. Biosafety				
<i>Is lab space adequate?</i>		not for biosafety		
<i>Can all doors and windows be closed?</i>		Some new hospital could closed, not for old hospital		
<i>Is Laboratory air conditioned?</i>		Yes, some		
<i>Are PPE, lab shoes, cabinets and wash-up available at entrance?</i>		Not all lab in provincial hospital		
<i>Is laboratory clean (e.g., benches, corners, alcoves for storage)?</i>		Some laboratory at provincial hospital		
<i>Is equipment clean (e.g., micropipettes, fridge)</i>		Yes		
<i>List biosafety equipment (e.g. autoclave, personal</i>		Yes existing for 5 provinces of EU project in attached file		

<i>protective equipment) not available, not operational, or old?</i>				
<i>List shortages of biosafety disposables?</i>		No		
<i>Is there a functioning system of liquid waste management</i>		Yes		
<i>Is there a functioning system of solid waste management?</i>		Yes		
<i>Is solid waste first autoclaved?</i>		NCLE yes, Some 5 provinces only		
<i>Is solid waste burned?</i>		Some burned some throw with public waste		
<i>Is incinerator working and up to standard</i>		Some province of EU project and some of big province (LPB, VT province)		
<i>Is solid waste dumped in compound or where?</i>		In compound dumped		
<i>When was last staff training for biosafety?</i>		May 2015 in 5 provinces only, March to May 2015 for all		
<i>Who is in charge of biosafety?</i>		Dr Noi Kaseumy Biosafety officer in each province		
<i>List any other problem in biosafety.</i>		Municipality waste dumped in compound is not aware of biosafety in town No, existing biosafety law for legacy safety to population(lawyer for drafting) No quality of biosafety standard in each health		

		facilities		
2. Range of Laboratory services				
<i>Is there a plan for lab development?</i>		Yes		
<i>List gaps in staffing.</i>		Will support list later		
<i>List critical diagnostic assays not available.</i>		Zika		
<i>List critical diagnostic assays not available in sufficient numbers to address essential public health needs.</i>		Will support list later		
<i>List major items of equipment not available, not functioning, or old.</i>		Autoclave not enough because two are broken		
<i>List lack of supportive equipment like fridges, transport box, stools.</i>		Will support list later, almost complete items for all province		
<i>List lack of testing supplies including reagents, rapid tests, disposable labware.</i>		Will support list later		
<i>How many tests per month total?</i>		800 tests per month		
<i>List top five diagnostics.</i>		Influenza, Dengue, Stool culture, Gen.pack culture and meales		
<i>How many referrals per month?</i>		NCLE, some		
<i>Referrals for what?</i>		For quality assurance		
3. Quality of Laboratory services				
<i>List gaps in in-service training for all staff.</i>		On the job train on quality 6 provinces (EU+KM) on quality assurance		

<i>List gaps in quality improvement program.</i>		NCLE- drafting standard of quality improvement program		
<i>List gaps in SOPs.</i>		Yes , existing		
<i>List gaps in equipment manuals.</i>		Yes, not completed		
<i>When micropipettes were calibrated last?</i>		More than one year		
<i>Maintenance and calibration records available for equipment?</i>		No, just small supported from EU		
<i>List problems in calibrating equipment.</i>		NO		
<i>List problems in maintaining equipment.</i>		Yes		
<i>List gaps in quality assurance program.</i>		NO		
<i>Is most equipment available?</i>		Some		
<i>Are many equipments due for replacement?</i>		Several equipment need replacement		
<i>Who maintains, contracting out?</i>		No		
<i>Leased equipment?</i>		Not available		
<i>Is there a budget for maintenance?</i>		NO		
<i>Is laboratory i/c monitoring lab performance?</i>		No		
<i>Any other issues?</i>				
4. Laboratory Management				
<i>Level and years of experience of Lab in charge?</i>		1998 as EPI and lab		
<i>Is there an annual lab plan and budget?</i>		Yes		

<i>Are SOPs available for Lab management?</i>		No		
<i>Is there record of Lab management meetings?</i>		Weekly meeting (minutes)		
<i>Is there a system of Lab staff supervision?</i>		Yes		
<i>Is computer and internet available?</i>		Yes		
<i>Are monthly reports submitted as required?</i>		Yes		
<i>What proportion of lab services is financed by government, partners and out of pocket?</i>		23% government 39% donor 38% Out of pocket and other		
<i>List gaps in financing.</i>				
<i>Has the lab been certified/accredited?</i>		National influenza center, National Meals center and JE(WHO)		
<i>Has the lab been audited?</i>		Yes, on program based		
Community laboratories				
<i>Type of available staff?</i>		Yes, 3 staff each District		
<i>Cleanliness?</i>		Not up to standard		
<i>Lab gowns available?</i>		Yes		
<i>Microscope working?</i>		Yes		
<i>Microscopy supplies incl reagents and collection supplies?</i>		yes		
<i>Power stabilizers and battery?</i>		No		
<i>Malaria rapid test?</i>		No		
<i>Dengue rapid test?</i>		No		
<i>Transport box?</i>		EPI box		
<i>Other tests?</i>		Paraclic blood test		

<i>How many tests per months total?</i>		?		
<i>How many referrals?</i>		?		
Technical Schools				
<i>Benches and stools?</i>	Not enough	Yes	Yes	Yes
<i>AV equipment?</i>	Yes	Yes	Yes	Yes
<i>Computers?</i>	Not enough	Yes	Not enough	Yes
<i>Teaching microscopes?</i>	Not enough	Not enough	Not enough	Not enough
<i>Microscopes?</i>	Yes	Yes	Yes	Yes
<i>Weighing scale??</i>	Yes	Yes	Yes	Yes
<i>Centrifuge?</i>	Yes	Yes	Yes	Yes
<i>Water bath?</i>	Yes	Yes	Yes	Yes
<i>Hematocrit reader?</i>	Yes	no	Yes	Yes
<i>Micropipettes?</i>	Not enough	Not enough	Not enough	Not enough
<i>Reagents?</i>	Not enough	Not enough	Not enough	Not enough
<i>Rapid tests?</i>	Not enough	No	Not enough	Not enough
<i>PPE?</i>	Not enough/old	No	Old	Yes
<i>Biosafety teaching material?</i>	Yes	Yes	Yes	Yes
<i>Laboratory manual?</i>	Yes	Yes	Yes	Yes
<i>Laboratory SOP?</i>	Few	Few	Some	Most