ECONOMIC ANALYSIS

A.   Introduction

1.   The Health Sector Development Program will support the Government of Bhutan in strengthening the electronic health information system, enhancing health financing mechanisms, and improving primary health care (PHC) services. The program has three outputs: (i) primary health services, especially in underserved areas, improved ($6 million), (ii) health sector financing enhanced ($10 million), and (iii) disease surveillance and health information system enhanced ($4 million).

2.   The program is expected to (i) improve PHC through investments such as in infrastructure (output 1); (ii) promote sustainable health financing (output 2) through support for the Bhutan Health Trust Fund; and (iii) increase the efficiency of the health sector through an integrated health information system (output 3). An economic analysis was conducted and an economic internal rate of return (EIRR) was calculated for project investments under output 1 in accordance with the Asian Development Bank (ADB) Guidelines for the Economic Analysis of Projects.[1]

B.   Economic Rationale

3.   Public investment in health can result in positive externalities of improved health outcomes, such as greater productivity, economic growth, longer life expectancy, educational attainment, and higher earnings. Evidence from a five-country study demonstrated that investments in health had a greater effect on wealth levels in all countries than investments in education, natural resources, and climate combined.[2] The government is the main financier of health care services and aspires to ensure free basic health services for all. This focus on health is one of the keys to achieving its national goal of gross national happiness.[3]

C.   Demand Analysis

4.   The health sector in Bhutan is experiencing an epidemiological transition. Noncommunicable diseases such as hypertension, cardiovascular conditions, and diabetes are on the rise; and diarrhea, skin infections, and hypertension are the leading causes of morbidity in the country.[4] Investments are required to manage these growing conditions at the PHC level, where costs are lower and noncommunicable diseases can be managed more effectively.[5]

5.   Demand for broader and easier access to health services is evident from the disparity in health outcomes based on income quintiles. Among the poorest, the infant mortality rate is as high as 68 deaths per 100,000 live births, compared with 28 for the upper fourth quintile; and the under-5 mortality rate is as high as 106, compared with 39 for the upper fourth quintile. Moderate stunting is 41.4% among the poor but 21.4% among the wealthy. As for indicators that demonstrate positive health-seeking behavior, only 33.2% of the poorest women gave birth in a health facility as compared to 95.2% of the richest quintile (Table 1).

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[1] ADB. 2017. *Guidelines for the Economic Analysis of Projects.* Manila.
[2] D. Jamison et al. Investing in Health: The Economic Case. Doha, Qatar: World Innovation Summit for Health, 2016.
[3] Government of Bhutan. 2017. *Finalized Guideline for the 12th Five-Year Plan.* Thimphu.
[4] World Health Organization. 2017. *Kingdom of Bhutan Health System Review.* Geneva.
[5] World Health Organization. *Noncommunicable Diseases.* http://www.emro.who.int/noncommunicable-diseases/publications/.

Table 1: Socioeconomic Disparities in Key Health Indicators, Bhutan

Indicator	Asset (Wealth) Index Quintile					
	Quintile 1 (poorest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (richest)	Total
Infant mortality rate	68.0	58.0	50.0	28.0	N/A	47.0
Under-5 mortality rate	106.0	88.0	74.0	39.0	N/A	69.0
Moderate stunting (%)	41.4	39.9	38.4	27.6	21.4	33.5
Weighed at birth (%)	43.9	56.3	73.6	88.2	97.3	72.2
Pregnant women delivering in a health facility (%)	33.2	40.8	64.4	79.9	95.2	63.0

N/A= not available
Source: 2012 Bhutan Living Standards Survey.

6.   PHC services serve the poorest quintiles in Bhutan the most, since distances are large and secondary and tertiary facilities are limited and geographically dispersed, making them difficult to access for the rural poor. Improving primary health services is therefore highly desirable from an equity perspective because it improves access for the poor, whose health outcomes are much lower than higher income quintiles. Improved access to quality health services at the periphery of rural and urban areas can also reduce the burden on secondary and tertiary institutions and contain the costs of care.

7.   The project investments are expected to establish five new urban satellite clinics and strengthen 182 basic health units (level 2) (BHU-IIs), 16 BHUs (level 1) (BHU-Is), and 10 district hospitals with limited infrastructure renovation and equipment. These investments will strengthen public health infrastructure. Other program investments in e-health and the Bhutan Health Trust Fund will increase the efficiency of the health system (Program Impact Assessment, accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President). These strategic investments are expected to improve access to quality health services, especially for the poor.

D.   Alternative Analysis

8.   Alternative options include investing in secondary and tertiary institutions rather than in primary care facilities. However, data suggests that investing in secondary and tertiary care is less cost-efficient than investing in PHC. According to the data in Table 2**,** shifting an outpatient from the national referral hospital (NRH) to a BHU-I would save Nu434 per visit, while shifting an inpatient from the NRH to a district hospital would save Nu7,732 per admission, the equivalent of $9.19 per visit and $163.81 per admission. The NRH had 483,381 outpatient visits and 73,825 inpatient admissions in 2015. If even 10% of these outpatient visits were shifted to BHU-Is, it would save the health sector $444,227 annually. Therefore, project investments in PHC facilities would be more cost effective for the health system than alternative options.

Table 2: Estimated Unit Costs of Outpatient and Inpatient Services by Type of Public Health Facility, 2009–2010 (Nu)

Facility Type	Outpatient Visits	Inpatient Admissions
National referral hospital	597	17,848
Regional referral hospital	832	16,534
District hospital	307	10,116
BHU-I (including ORCs)	163	5,657
BHU-II (including ORCs)	161	NA

BHU-I = basic health unit level 1, BHU-II = basic health unit level 2, NA = not applicable, ORC = outreach clinic.
Note: BHU-II facilities do not have inpatients.
Source: Government of Bhutan, Ministry of Health. Forthcoming. *Benefit Incidence of Public Health Expenditure in Bhutan.* Thimphu.

E.   Assumptions, Costs, and Benefits

9.   **Assumptions**. The economic analysis reviews a 20-year period inclusive of the program life cycle from 2018–2023. Productivity gains measured in disability-adjusted life years (DALYs) and health care cost savings by target beneficiaries are the quantified economic benefits of the project investments. The economic costs considered are the capital investment costs and the operation and maintenance of the new assets. As per ADB guidelines, a 6% discount rate was applied, and constant 2018 prices were used in the analysis. An exchange rate of Nu64.885 = $1.00 (as of 10 April 2018) was applied. The target population is the entire population residing in the eight focus districts.[6]

10.   **Economic costs.** All economic costs are estimated by applying the domestic price numeraire method and adjusted by a shadow wage rate factor of 0.93, standard conversion factor of 1.00, and shadow exchange rate factor of 1.005.[7] While the financial cost of the project is $6.26 million, the economic costs after adjustments and exclusion of price contingencies, taxes, and duties is $5.62 million. The total capital cost includes equipment, civil works, capacity development, and consulting services; operation and maintenance costs of $0.46 million per year include recurrent costs to run health facilities.[8]

11.   **Economic benefits.** To estimate benefits, the DALYs and health care cost savings were used. Health care cost savings were estimated based on the decrease in out-of-pocket (OOP) expenditures for households due to project investments. The analysis assumes that the project will reduce 20% of all OOP expenditure related to primary care services.[9] Productivity gains are estimated based on specific DALYs averted through the project. The analysis assumes that, of the total DALYs addressed at PHCs, 70% will be averted.[10]

12.   Improved access to comprehensive primary care services will lead to specific economic benefits:

(i)   reduction in household expenditure on illness (private consultation fees, drugs, travel, and diagnostic costs) by improving access to public services;
(ii)   improved economic productivity by reducing the number of productive days lost from illness; and
(iii)   increased household consumption due to reductions in OOP payments, leading to more disposable household income.

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[6] It is assumed that the total target population in the eight districts will be reached in a phased manner over the project years, from 75%–95%, and that the target population will grow at 1.57% per annum. The eight focus districts are Dagana, Mongar, Pema Gatshel, Samdrup Jonkhar, Trashigang, Trashi Yangtse, Trongsha, and Zamgang. The total beneficiary population for the eight districts in 2018 was 261,938.

[7] ADB. 2018. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Kingdom of Bhutan for the Secondary Towns Urban Development Project.* Manila. The analysis also assumes that for civil works, Bhutan's labor is 70% unskilled and 30% skilled.

[8] Operation and maintenance costs include staff salaries, maintenance and replacement of equipment and infrastructure, and other running costs such as water and electricity. The maintenance cost for key equipment is 5% of the total cost, and the equipment lifespan is 10 years (the replacement cost after 10 years of key equipment is included in the cost estimation).

[9] Duke Global Health Institute. 2016. *Measuring Household Out-of-Pocket Health Expenditure.* Durham, North Carolina.

[10] A. Sobry et al. 2014. Caseload, management, and treatment outcomes of patients with hypertension and/or diabetes mellitus in a primary health care program in an informal setting. *Journal of Tropical Medicine and International Health*, 19(1):45-57.

13.   Improvements in PHC services can lead to cost savings from fewer private outpatient visits, and to better access to closer public facilities, which can reduce transportation, private consultation, diagnostic, and drug costs. Better primary care services can also improve overall productivity. Given better health, fewer working days are lost to illness, resulting in more income for families and increased household consumption. In addition, improved primary care services can boost the efficiency of the health sector by relieving the burden on secondary and tertiary care facilities. More comprehensive PHC services that are available peripherally and at lower cost also translate into cost savings for government-financed care (Table 2). The EIRR factors in productivity gains from the DALYs averted and cost savings from reduced household OOP payments.

F.   Economic Internal Rate of Return and Sensitivity Analysis

14.   The cost–benefit analysis indicates an estimated EIRR of 16% and an economic net present value of $2.64 million. The cost per DALY saved is estimated at $12.7.

Table 3: Economic Internal Rate of Return
($, constant 2018 prices)

Year	Investment Cost	Recurrent Cost	Total Cost	Health Care Cost Savings	Productivity from DALYs saved	Total Benefits	Net Benefit	Cost per DALY Saved
2018	(1,065,143)		(1,065,143)	686,930	35,235	722,165	(342,977)	30.2
2019	(3,008,814)		(3,008,814)	697,681	35,787	733,468	(2,275,346)	84.1
2020	(906,084)		(906,084)	708,600	36,347	744,947	(161,137)	24.9
2021	(295,574)		(295,574)	767,669	39,376	807,046	511,472	7.5
2022	(192,530)		(192,530)	779,684	39,993	819,676	627,146	4.8
2023	(150,980)		(150,980)	791,886	40,619	832,505	681,524	3.7
2024		(457,488)	(457,488)	854,547	43,833	898,380	440,892	10.4
2025		(457,488)	(457,488)	867,921	44,519	912,440	454,952	10.3
2026		(457,488)	(457,488)	881,504	45,215	926,720	469,232	10.1
2027		(457,488)	(457,488)	895,300	45,923	941,223	483,736	10.0
2028		(457,488)	(457,488)	962,801	49,385	1,012,187	554,699	9.3
2029		(457,488)	(457,488)	977,869	50,158	1,028,028	570,540	9.1
2030		(457,488)	(457,488)	993,174	50,943	1,044,117	586,629	9.0
2031		(457,488)	(457,488)	1,008,717	51,741	1,060,458	602,970	8.8
2032		(457,488)	(457,488)	1,024,504	52,550	1,077,055	619,567	8.7
2033		(497,578)	(497,578)	1,098,346	56,338	1,154,684	657,106	8.8
2034		(457,488)	(457,488)	1,115,535	57,220	1,172,755	715,268	8.0
2035		(457,488)	(457,488)	1,132,994	58,115	1,191,109	733,622	7.9
2036		(457,488)	(457,488)	1,150,726	59,025	1,209,751	752,263	7.8
2037		(457,488)	(457,488)	1,168,735	59,949	1,228,684	771,196	7.6
TOTAL	(5,619,126)	(6,444,915)	(12,064,041)			19,517,396	7,453,355	12.7
			ENPV	2,643,239		**EIRR**	16%	

( ) = negative, DALY = disability-adjusted life year, EIRR = economic internal rate of return, ENPV = economic net present value.
Source: Asian Development Bank estimates.

15.   **Sensitivity analysis.** Sensitivity analysis was performed to determine the EIRR in the event of adverse external changes during project implementation that would negatively affect the project. The two scenarios considered were (i) 20% increase in project cost and (ii) 20% decrease in estimated project benefits. The EIRR fell to 11% under the first scenario, and to 8% under the second scenario. Both EIRRs indicate that the project will remain economically viable.

Table 4: Sensitivity Analysis of the Economic Internal Rate of Return

	Base Scenario	Scenario 1: 20% Increase in Project Cost	Scenario 2: 20% Decrease in Project Benefits
ENPV ($)	2,643,239	1,657,663	526,313
EIRR (%)	16	11	8
Cost per DALY saved over a 20-year period ($)	12.67	13.85	15.84

DALY = disability-adjusted life year, EIRR = economic internal rate of return, ENPV = economic net present value.
Source: Asian Development Bank estimates.

G.   Distribution Analysis

16.   The project beneficiaries (output 1) include the entire population in the eight focus districts, and program beneficiaries (output 2 and 3) include the entire population of Bhutan. Currently, in Bhutan, key disparities in the use of health services exist by income quintile, with the richest accessing secondary and tertiary care services more than the poor, mainly because of geographical access issues and high out-of-pocket transportation costs. However, services obtained from PHC facilities (BHU-Is and BHU-IIs) are consistently benefiting the poor since these facilities are geographically closer and easier for the poor to access.[11] Available household survey data also shows sharp differentials in health outcomes (Table 1) across income quintiles, which will be addressed through project investments and by improving access to health care for the poor. Investments in PHC facilities in urban and rural areas will improve equity and health outcomes by improving health access for the poor.

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[11] Government of Bhutan, Ministry of Health. Forthcoming. *Benefit Incidence of Public Health Expenditure in Bhutan.* Thimphu.