

## ECONOMIC AND FINANCIAL ANALYSIS REPORT

### A. Sector Context

1. Nepal remains one of the most hazard-prone countries in the world, and school infrastructure is vulnerable to massive disaster events. The damages and losses of devastating Gorkha earthquakes in April and May 2015<sup>1</sup> were assessed at \$8.4 billion,<sup>2</sup> with 8,790 casualties, 22,300 injuries and overall 8 million people affected, almost 29% of the population.<sup>3</sup> The damages and losses of school infrastructure stand out next to housing sector. Nearly 7,000 schools were completely or significantly damaged. The casualties of children and youth would have been even larger if the first massive earthquake in April 2015 occurred on regular school days. It is estimated that over 45,000 classrooms need repair or reconstruction with high financing requirements between 2016 and 2019.

2. The Disaster Resilience of School Project (DRSP) aims to provide safer schools and communities as well as develop improved learning environment. This project impact expected is: disaster risk management for human resource development enhanced. The three project outputs are (i) heavily damaged public school infrastructure reconstructed and facilities improved; (ii) unsafe public schools retrofitted and disaster risk reduced; and (iii) institutional capacity for management and disaster resilience strengthened. The project will reconstruct and/or retrofit 174 schools in 14 severely affected districts in 2015 Nepal earthquake.<sup>4</sup> The project implementation period is 5 years (2018–2023) and includes capacity development activities to strengthen DRM for school children and surrounding communities. Because School Sector Development Plan (SSDP) is ongoing and it includes policy measures to improve education quality through sector-wide approach, the project focuses on disaster resilient public school infrastructure development and DRM.

### B. Economic Rationale for Investment in Disaster Resilient School Infrastructure

3. The public investment in education, particularly disaster resilient schools, is often justified by externalities of schooling, economies of scale and public goods. Externalities could take the form of nurturing good citizens, enhancing the productivity of co-workers, and reducing crimes. Marginal cost of increasing another student to school is smaller than the average cost of educating each individual student, and there is an efficiency argument for group consumption of educational services through economies of scale. In addition, some parents with borrowing constraints could not invest socially desirable level of education for their children. Schools can function as public goods, particularly for search-and-rescue operations after the earthquake, because schools meets nonrivalry in consumption and nonexcludability in access for disaster affected people. Investing in education produces quality human capital and fosters innovation which leads to higher productivity and economic growth.

4. Access to school education, teaching and learning are hampered at temporary learning centers (TLCs) in disaster affected areas. Families migrate to other places to seek better education access and quality. TLCs are light structures with simple tin roofs; no laboratories facilities and libraries; unreliable power supply, and no noise barriers or clear boundaries between

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<sup>1</sup> 7.6 magnitude earthquake hit Nepal on 25 April 2015 (Sat) followed by 7.3 magnitude earthquake on 12 May 2015.

<sup>2</sup> National Reconstruction Authority. 2016. *Nepal Earthquake 2015 Post Disaster Recovery Framework 2016–2020*. Kathmandu.

<sup>3</sup> National Planning Commission. 2015. *Nepal Earthquake 2015 Post Disaster Needs Assessment*. Kathmandu

<sup>4</sup> 14 severely affected districts in 2015 earthquake were Okhaldhunga, Dolakha, Sindhupalchok, Rasuwa, Sindhuli, Ramechhap, Kavrepalanchok, Nuwakot, Dhading, Makwanpur, Lalitpur, Bhaktapur, Kathmandu, and Gorkha districts.

adjacent classrooms, that provide inadequate facilities for learning, particularly during the rainy and summer season. Teachers also have limited space and teaching materials. With this backdrop, improvement in promotion rate is stagnated in 14 disaster affected districts after 2015 when the earthquake hit Nepal. According to the Flash Reports, prior to the earthquake in 2014, the 14 districts have 85.2% for grade 1–5, 89.9% for grade 6–8 and 91.4%, which was higher than the average of other districts (84.1% for grade 1–5, 89.2% for grade 6–8 and 91.1% for grade 9–10). However, after the earthquake in 2016, the promotion rates in 14 districts (86.9% for grade 1–5, 90.4% for grade 6–8 and 91.0% for grade 9–10) became same or below the remaining districts (87.4% for grade 1–5, 90.4% for grade 6–8 and 91.3% for grade 9–10). This is driven by the stagnated improvements in repetition rate and dropout rate, and this project will close this gap between 14 districts and remaining districts.

5. Despite remarkable improvements in access to education over the last few decades, improvement in education quality has been modest in Nepal. Safe school infrastructure is critical as outlined in SSDP but is not a sufficient condition to improving learning outcomes. DRSP, complemented by SSDP, is expected to contribute to enhance education access and quality. These improvements are collectively expected to raise productivity with higher wages in the labor market.

6. Another economic rationale is saving people's lives and injuries at school when it comes to disaster events. Disaster resilient school infrastructure is likely to save lives of students and teachers. Moreover, after disaster events, schools can provide safe shelters not only for students and teachers but also for people living in school catchment areas. They can receive medical treatment, water and foods more efficiently at school. While this is hard to quantify in economic values, disaster resilient schools also become hubs for social community networks, information sharing and reducing psychological stress of fear from their houses being collapsed during aftershocks.

### **C. Demand Analysis**

7. More than 72% of the school buildings of the country's 35,000 schools require seismic retrofitting.<sup>5</sup> A 2016 study, Structural Integrity Damage Assessment (SIDA) estimated that 2,234 schools are heavily damaged and not in use in 14 districts severely affected by the 2015 earthquakes.<sup>6</sup> These schools are functioning under temporary learning centers (TLCs) with limited service life and lack adequate facilities for learning such as laboratories, libraries and information and communication technologies (ICT). An additional 3,569 partially damaged schools with identified retrofitting or repair needs remain in use. The SIDA survey shows that all these schools are vulnerable to seismic hazards. Further to resilient school infrastructure needs, other disaster risk management (DRM) actions are necessary to safeguard communities and investments.

8. Despite supports from development partners, the significant funding gap remains for disaster resilient schools. The financing requirement for education sector is estimated as NRs 180.6 billion in Post Disaster Recovery Framework 2016-2020, but ongoing investment projects supported by development partners can only provide around NRs 36.9 billion. The remaining

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<sup>5</sup> Vishokarma, J.S., Dahal, R.H., Acharya, S.P. Guragain, R. and A.M. Dixit. 2012. Implementing School Retrofitting Program in Nepal: Experiences and Lessons Learned, 15<sup>th</sup> World Conference on Earthquake Engineering, Lisbon.

<sup>6</sup> Department of Education and World Bank. 2016. *Structural Integrity and Damage Assessment*. Kathmandu.

financing gap of NRs143.7 billion during 2016–2020 (on average, NRs28.7 billion per year) needs funding from government or new projects supported by development partners.

9. Number of secondary school enrollment is expected to grow continuously in targeted 174 schools at disaster affected areas. With improved grade 1 intake and repetition rate as well as decreasing fertility rate, the number of basic education students is likely to decrease continuously. However, number of secondary (grade 9 and 10) and higher secondary (grade 11 and 12) students in 174 secondary schools will increase steadily because of the improved repetition and drop-out rate. The secondary schools have its own students in basic education, but receive secondary school students from basic education schools in its catchment areas. Until the project is completed, total number of students in secondary schools is declined, but the trend is projected to reverse after the completion of the project.

**Table 1: Projections of Student Enrollment**

Year	2016	2023	2026	2029	2032
1. Basic education	43,650	39,596	36,262	35,929	35,530
2. Secondary	16,738	17,404	18,747	20,147	21,619
3. Higher secondary	7,576	9,092	11,899	14,674	18,123
<b>4. Total</b>	<b>67,964</b>	<b>66,092</b>	<b>66,908</b>	<b>70,751</b>	<b>75,271</b>

Source: Asian Development Bank estimates.

#### D. Alternative Analysis

10. The proposed project aims to provide disaster resilient school infrastructure in disaster affected areas, but alternative project option is to construct or retrofit traditional school infrastructure without disaster resilient structures. The cost for civil works is cheaper for traditional school than disaster resilient school, but disaster resilient school prevents property damages and fatal casualties in the event of massive disasters and can also serve as safe shelter in the aftershocks. Historically, the probability of significant earthquake event is once in 80 years, but a study conducted after earthquake in 2015 shows that geologic fault is not sufficiently slipped, and the energy is still stored which may trigger a significant magnitude earthquake in near future.<sup>7</sup> Therefore, it is important to have disaster resilient school infrastructure development in the 14 disaster affected districts, and the government is committed to provide safe learning environment for the citizens in Nepal.

11. 174 schools are selected considering several criteria in 14 disaster affected areas. The selected schools are selected four based on explicit criteria: (i) student enrollments, (ii) scale of damage, (i) percentage of girls and (ii) percentage of Dalits.<sup>8</sup> There are informal criteria such as balance in number of schools to be reconstructed or retrofitted. The government represented by the Ministry of Education, Science and Technology (MOEST) is responsible for final selection of schools, but all the selected schools need to be justified in light of these criteria. Whether schools are reconstructed or retrofitted is determined by the nature and scale of the damages.

<sup>7</sup> David Mencin, Rebecca Bendick, Bishal Nath Upreti, Danda Pani Adhikari, Ananta Prasad Gajurel, Roshan Raj Bhattarai, Hari Ram Shrestha, Tara Nidhi Bhattarai, Niraj Manandhar, John Galetzka, Ellen Knappe, Beth Pratt-Sitaula, Abdelkrim Aoudia & Roger Bilham. 2016. *Himalayan strain reservoir inferred from limited afterslip following the Gorkha earthquake*. Nature Geoscience 9, 533-537.

<sup>8</sup> Dalit is a historically disadvantaged occupational group.

## E. Cost–Benefit and Sensitivity Analyses

12. The economic analysis of DRSP calculates the economic net present value (ENPV) and economic internal rate of return (EIRR) under with and without project scenario. The disaster resilient public school infrastructure development, with DRM activities, is a scenario with-project; and without-project scenario assumes that schools have to use TLCs continuously and replaced every 4 years. To estimate benefit streams, the economic analysis compares additional number of students and improved education quality quantified by labor market wage with different education background (no education, basic education, secondary education and higher education). The benefit streams also include internal efficiency gain and lives and injuries saved from the next big disaster event. The economic cost is computed by using additional direct investment, operation and maintenance (O&M) cost as well as opportunity cost of students during the school period. The sensitivity analysis is also conducted for both optimistic and pessimistic scenarios to assess the impact of potential changes.

13. The specific assumptions used in the analysis are based on information available in (i) EMIS, (ii) Nepal Living Standard Survey (NLSS) 2010/11, and (iii) Economic Survey 2016/17, (iv) Post Disaster Needs Assessment for Nepal Earthquake 2015, (v) Post Disaster Recovery Framework for Nepal Earthquake 2015, and (vi) consultations with various stakeholders. The key assumptions used for the economic analysis of the project are below.

14. **General assumptions** are the followings:

- (i) The official average exchange rate of NRs102.13 = \$1.00 as of 2 February 2018 from Nepal Rastra Bank is used for converting foreign exchange costs to local currency equivalent.
- (ii) The real wage increase is assumed to be 5.0% per year.<sup>9</sup>
- (iii) Taxes, duties, and price contingencies are excluded in computing ENPV and EIRR while physical contingencies are included because they represent the monetary value of additional real resources that may be required beyond the base cost to complete the program.
- (iv) All costs were valued using the domestic price numeraire. The economic price of traded goods was considered to equal their financial price by using a shadow exchange rate factor of 1.084 (estimated based on import and export trade data for Nepal during 2014–2016). Costs were adjusted by shadow wage rate factors of 0.7 for unskilled labor and 1.0 for skilled labor to arrive at the economic opportunity cost. The shadow exchange rate factor and shadow wage rate factors are based on recently approved ADB-funded project in Nepal.<sup>10</sup>
- (v) A 6% economic discount rate is used because this is a social sector project to satisfy basic needs.
- (vi) A 5-year preparation and construction period starting in 2018 and operational period of 20 years following the construction was used for the economic analysis.
- (vii) A straight-line depreciation method was used to calculate the salvage value of physical school infrastructure at the end of the analysis period. Physical school

<sup>9</sup> The assumption for 5.0% wage increases is based on annual growth rate of per capita GDP at constant prices in recent years under *Economic Survey Fiscal Year 2016/17* by Ministry of Finance, Government of Nepal. This is a proxy for real wage increase. This is also within the range of 4.6% (2014) and 9.1% (2017) calculated by annual growth of average national salary and wage index subtracted by annual average inflation rate (*Current Macroeconomic Situation*, Nepal Rastra Bank).

<sup>10</sup> ADB. 2017. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Technical Assistance Grant Nepal: Rural Connectivity Improvement Project*. Manila.

infrastructure is assumed to have a life of 50 years, and salvage value was calculated based on this assumption.

15. **Benefit streams are estimated considering graduation, internal efficiency, disaster mitigation and quality of education** as outlined below,

- (a) **Graduation benefit** is estimated based on benefits of the project expected due to increase in completers and the corresponding increase in wages. School construction project can improve years of schooling contributing to increase wages,<sup>11</sup> and this is computed from additional number of basic, secondary and higher secondary completers and wage levels of labor with corresponding educational background. These completers will earn higher wages relative to non-completers. The additional number of school completers is generated through improved rate of access to education, repetition rate and dropout rate. With project, rate of change in student intakes at grade 1, 6, 9, and 11 is expected to catch up with national average. However, without project, it is assumed that there will be no improvement on promotion, repetition and dropout rates in the 14 earthquake affected districts. The repetition and dropout rates are projected to follow SSDP target figures with project scenario. The wage level by education level is based on NLSS 2010/11, and wage with no education is NRs21,809, wage with basic education is NRs66,596, wage with secondary education is NRs93,423, and wage with higher secondary education is NRs131,393. This figure is calculated by simple means without controlling for covariates.
- (b) **Internal efficiency benefits** gains represent decreased wastage of public and private resources as a result of reduced repetition and dropouts through the project compared without project scenario of using TLCs. Better education facilities improve teaching and student achievements, and female toilet and sanitary facilities could reduce dropouts in secondary education. Years required for graduating basic and secondary education will be shorter because of the improved rate of repetition and dropout and student-cohort analysis indicates that the project will save 1.05 student-years per basic education completers and 1.1 student-years per secondary education (including higher secondary) completers. The savings apply to public unit cost. It is assumed that it takes 8 years to have full efficiency gain for basic education and 4 years for secondary education.
- (c) **Disaster impact mitigation benefits** resilient school infrastructure and capacity development for disaster preparedness will save people's lives and injuries at school in the events of next massive disaster. The economic analysis assumes that same casualties (8,790 death toll, 111,7000 outpatients and 41,200 inpatients)<sup>12</sup> as a proportion of the population of the 14 affected districts in 2015 earthquake will be generated in the event of next great earthquake. This proportion is applied to the student population that as labor force (42 years), average annual wage in Nepal (NRs50,953 in NLSS 2010/11) and probability of next great earthquake in Nepal. The average annual wage is a proxy for the loss of labor inputs to the national economy. Based on the historical record of great earthquake in Nepal, the economic analysis assumes that magnitude 8.0 or greater will

<sup>11</sup> Esther Duflo. 2001. *Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment*. The American Economic Review, Vol. 91, No.4 (Sep 2001), pp795-813.

<sup>12</sup> Death toll is from post disaster recovery framework 2016-2020 and number of outpatients and inpatients are from Bulletin of World Health Organization (Post-earthquake health-service support, Nepal). The number of injuries is reported as more than 22,300 people in the post disaster recovery framework 2016-2020, so the number of outpatients and inpatients used in this analysis is conservative estimate. The cost of outpatient and inpatient is based on a study conducted in 2011 (Catastrophic household expenditure on health in Nepal: a cross sectional survey).

happen once in 80 years. The probability of this great earthquake event is further refined considering school days (approximately 5 days per week) and school hours (6 hours per day). The total loss of expected value of labor inputs to the national economy per year is NRs1.0 million and cost of outpatients and inpatients per year is NRs11 thousand (both 2010/11 price). This is a conservative estimate because 2015 earthquake occurred on Saturday, but this analysis assumes that people's lives at school will be saved with project.

- (d) **Improved facilities benefit** – In addition to new school infrastructure, these benefits are expected from improved science laboratory facilities, libraries, ICT, facilities for girls (toilets, changing rooms, incinerators) and improved menstruation health and hygiene. These new facilities are expected to contribute to quality education which benefits all school completers. The literatures, though limited, suggest that school construction projects (including school libraries, computers, science laboratories) can improve test scores,<sup>13</sup> and the effectiveness of supply side school infrastructure and resource development is enhanced if it were combined with community participation or incentives for behavioral changes.<sup>14</sup> It is also widely understood that education quality measured by test scores is strongly associated with economic growth,<sup>15</sup> which is related to wage increase. Because the proposed project runs parallel with SSDP, school completers from the proposed project is expected to earn wage with additional premium when they enter into labor market.

The improvement in education quality comes from better facilities, such as labs and computers, and less distraction due to better sound insulation. Accurate estimation of education quality premium is difficult, but SSDP economic analysis assumes fixed rate of 5.5% throughout the analysis period.<sup>16</sup> SSDP is supported by results-based lending covering holistic areas, and economic analysis result is considered a conservative estimate. However, education quality depends on principal leadership, quality of teacher, textbook and others; and disaster resilient school infrastructure alone might not achieve this level of improvement. As it is difficult to estimate the quality premium attributable only to the facilities improvement, this economic analysis tests under a range of the quality premium from 1.5 to 2, ie 27% to 36% of the total premium to derive the benefit streams through education quality enhancement.

16. There are other intangible social benefits. For instance, there will be positive externalities through greater social cohesion, reduced crime rate, and better health status of children from educated mothers. These are all important potential benefits derived from this project, but given they are difficult to quantify, they are not included in this economic analysis.

17. **Assumptions for estimating costs** are based on both additional direct costs and opportunity costs of students. The project economic costs are costs of the project's three outputs. Project costs include costs for school reconstruction, retrofitting, equipment and materials, salaries for consultants. In addition, direct costs include operation and maintenance (O&M) cost for schools which is estimated as \$7,500 per year per school to maintain school infrastructure in

<sup>13</sup> Ana Cuesta, Paul Glewwe and Brooke Krause. 2015. *School Infrastructure and Educational Outcomes: A Literature Review, with Special Reference to Latin America*.

<sup>14</sup> Serna Masino and Miguel Niño-Zarazúa. 2016. *What works to improve the quality of student learning in developing countries?* International Journal of Educational Development.

<sup>15</sup> Erik A. Hanushek and Ludger Woessmann. 2015. *The Economic Impact of Educational Quality*. Handbook of International Development and Education.

<sup>16</sup> ADB. 2016. *Report and Recommendation of the President to the Board of Directors Proposed Results-Based Loan and Technical Assistance Grant Nepal: Supporting School Sector Development Plan*. Manila

reasonably good condition for 50-year service life. The O&M cost is subtracted by cost in without-project scenario where TLCs need to be replaced every 4 years. TLC requires NRs6,000 per square feet and one classroom is assumed to have 25 square feet with 30 students.

18. To derive the economic costs, project costs were classified into three categories: (i) unskilled labor, (ii) tradable goods, and (iii) other expense. While the financial cost of the project is \$198.8 million, the project costs after adjustment for distortions in market prices and exclusion of price contingencies stand at \$159.6 million. To get the total economic costs, household and student costs have been added in addition to O&M costs. The student opportunity cost is assumed to be NRs11,568 per student per year during school enrollment, and this is an annual wage for out-of-school age children in 2010/11 in NLSS. The total economic cost of the project is NRs25.7 billion, and this economic cost is used to estimate ENPV and EIRR.

19. The ENPV for the base case scenario was calculated to be NRs 4.9 billion, and the EIRR was estimated at 7.8%. The analysis also considered two other scenarios—a pessimistic case and an optimistic case—based on different assumptions. The assumptions under these scenarios and the derived ENPVs and EIRRs are shown in Table 2. The cost and benefit streams for base case scenarios are shown in Table 3.

**Table 2: Pessimistic Case, Base Case, and Optimistic Case**

Item	Pessimistic		Optimistic
	Case	Base Case	Case
Wage increase rate (%)	4.0	5.0	6.0
Education quality premium (%)	1.5	2.0	2.5
O&M budget allocation per school per year (\$)	5,000	7,500	10,000
Number of fatal casualties	4,395	8,790	17,580
Number of outpatients	58,500	117,000	234,000
Number of inpatients	20,600	41,200	82,400
ENPV (NRs billion)	0.8	4.9	11.5
EIRR (%)	6.3	7.8	9.7

EIRR = economic internal rate of return, ENPV = economic net present value, NRs = Nepal Rupee, O&M = operations and maintenance

Source: Asian Development Bank estimates.

**Table 3: Economic Internal Rate of Return Based on Base Case Scenario**  
(NRs million)

Year	Cost				Benefit					
	Investment	O&M	Opportunity Cost	Total	Quantity	Quality	Efficiency	Lives Saved	Total	Net Benefit
1	936.3	(295.6)	-	640.7	-	-	-	-	-	(640.70)
2	5,450.0	-	-	5,450.0	-	-	-	-	-	(5,450.04)
3	6,410.1	-	-	6,410.1	-	-	-	-	-	(6,410.11)
4	2,443.1	-	-	2,443.1	-	-	-	-	-	(2,443.12)
5	1,061.4	(295.6)	-	765.8	-	-	-	-	-	(765.79)
6	-	133.3	5.3	138.6	-	-	386.8	-	386.8	248.19
7	-	133.3	98.8	232.0	12.7	29.0	133.4	1.9	177.1	(54.95)
8	-	133.3	222.5	355.8	43.0	64.0	152.7	2.0	261.7	(94.10)
9	-	(162.4)	366.7	204.3	93.9	104.5	172.8	2.1	373.3	168.97
10-14	-	370.8	2,963.1	3,333.9	2,580.2	1,356.4	1,168.4	12.4	5,117.3	1,783.47
15-19	-	370.8	4,699.1	5,069.8	10,577.8	3,549.0	1,503.0	15.8	15,645.6	10,575.84
20-24	-	370.8	7,212.3	7,583.0	29,952.1	7,384.8	1,828.7	20.2	39,185.8	31,602.78
25	(9,780.6)	(162.4)	1,858.0	(8,085.0)	10,095.5	2,149.6	413.0	4.7	12,662.7	20,747.74
Total	6,520.4	596.1	17,425.7	24,542.2	53,355.2	14,637.2	5,758.8	59.2	73,810.4	49,268.19
					NPV= 4,924			EIRR= 7.8%		

IRR = internal rate of return, O&M = operation and maintenance, NPV = Net present value.

<sup>a</sup> Investment cost is a sum of capital cost and recurrent cost.

Source: Asian Development Bank estimates.

20. **Sensitivity analysis.** The sensitivity of ENPV and EIRR to three other scenarios was also considered: (i) a 10% increase in capital costs, (ii) a 10% decrease in benefits, and (iii) the combined effect of a 10% increase in costs and a 10% decrease in benefits. Sensitivity analyses were also carried out on the base case, by varying 10 percentage points for two relatively sensitive program-related variables: (i) education quality premium; and (ii) real wage increase. The results are shown in Table 4. Not surprisingly, ENPV and EIRR are sensitive to real wage increase because the benefits are based on wage differences between with and without the program. Nevertheless, sensitivity analyses show that the proposed project will yield at least 6% EIRR with various assumptions, suggesting that it will produce valuable economic benefits overall.

**Table 4: Net Present Value, Economic Internal Rate of Return, and Sensitivity Analysis**

Scenarios	Switching Value	Variation	ENPV (NRs billion)	EIRR (%)
Base Case			4.9	7.8
Increase in capital costs	+35%	+10%	3.5	7.2
Decrease in overall benefits	-22%	-10%	2.7	7.0
Increase in costs and decrease in benefits	11%	10%	1.3	6.5
Education quality premium <sup>a</sup>	-2.1%	-1.0%	2.6	7.0
Wage increase rate <sup>a</sup>	-1.5%	-1.0%	1.4	6.6

EIRR = economic internal rate of return, ENPV = economic net present value.

<sup>a</sup> Switching value and variation are percentage points.

Source: Asian Development Bank estimates.

## F. Distribution Analysis

21. The targeted schools are proposed by central level project implementation unit-education (CLPIU), but selection criteria include consideration of gender and disadvantaged group in Nepal. The gender equity in school is quite high in Nepal, but selection of school puts weight to provide more education opportunities for female. In addition, compared with other development region, Central development region has larger number of Dalit, and the project aims to provide benefits for disadvantaged groups. The project also takes into consideration of the balance across 12 districts, and approximately 10-15 schools per district are expected to be reconstructed under the project. Among the proposed 174 schools, 70% of schools are located in rural area as opposed to 30% in urban area. This geographical distribution will improve access to school for hard-to-reach children.

22. The poverty impact ratio is grossly estimated at 28.0% taking into account of three stakeholders: (i) students (graduates), (ii) workers and (iii) government. The 14 disaster affected districts are located in four regions: (i) mountain, (ii) rural hills-central, (iii) rural hills-western and (iv) urban regions. The percentage of population living below the poverty line is 42.3% in mountain region, 29.4% in rural hills-central, 28.0% in rural hills-western and 11.5% in urban.<sup>17</sup> The poverty headcount rate weighted by population in each region in targeted districts is estimated at 24.8% which serves as a basis for share to the poor in students (graduates). These figures are based on the NLSS 2010/11, and the poverty has been improved since then, but 70% of 174 targeted schools are in rural areas in these regions, and poverty headcount rate must be still relatively high.

<sup>17</sup> Central Bureau of Statistics in Nepal. 2011. *Poverty in Nepal 2010-11*. Kathmandu.



23. The income change for workers (NRs 504 million) is estimated based on the difference between economic and financial costs particularly related to wage through civil works, and share to the poor is calculated based on the proportion of unskilled labors among total workers (including both skilled and unskilled labors). The income change for the government (NRs 640 million) comes from tax by assuming 13% of ENPV, and share to the poor for the government (37.4%) is estimated based on actual government expenditure in 2015/16 related to social expenditure and earmarked poverty programs taken to benefit the poor directly (i.e., agriculture, forestry, fishing and hunting, housing and community amenities, health, education and social protection). The income change for students (graduates) are rest of ENPV (NRs 3,780 million). The majority of the beneficiaries are students, and it would be reasonable to assume nearly 30% of ENPV benefit the poor through this project which is slightly above the overall poverty headcount rate in 14 districts (Table 5).

**Table 5: Poverty Impact Ratio**

Group	Income change (NRs million)	Share to the poor (%)	Income change for the poor (NRs million)
Students (Graduates)	3,780	24.8	936
Workers	504	40.0	202
Government	640	37.4	240
ENPV	4,924		
Total poverty impact			1,377
Poverty impact ratio			28.0%

ENPV = economic net present value

Source: Asian Development Bank estimates based on NLSS 2010/11, Population Census 2011, Budget Speech of Fiscal Year 2017/18

24. The proposed disaster resilient school infrastructure and capacity development for disaster risk management provide better learning environments for female and students in special needs. The reconstructed schools will have sex-disaggregated toilets and toilet for special needs with adequate space. The changing room and installation of incinerators are incorporated in school design. The stairs, ramps, lights and play grounds are designed to be accessible for people in special needs. Disaster preparedness and school safety awareness assessment will identify different needs of girls and women including persons with special needs and be addressed in the disaster preparedness plan. These positive effects on disaster preparedness will spillover to students' household members.

## **G. Fiscal Affordability and Sustainability Analysis**

25. The real GDP growth was reduced to 0.01% in 2015-2016 from 3.0% in 2014–2015 because of the earthquake and trade disruptions, but the economic growth rate recovered from the following years. The growth averaged 4% over the last decade, but the growth rate is estimated around 6.9% in 2016–2017, 4.9% in 2017–2018 and 5.5% in 2018–2019.<sup>18</sup> While natural disasters such as floods affected economy even after the earthquake, post-earthquake reconstruction stimulated economic activities. Although remittance growth might slow down due to the fall in the out-migration of workers, Monthly remittance flows reached record high of \$680 million in March 2018 and remittance accounted for more than one quarter of GDP which is one of the highest countries in the world.<sup>19</sup> The inflation rate is moderated from 9.9% in 2015–2016 to 4.5% given the increased agricultural production. There was overall fiscal surplus during 2012–2014, but it turned into fiscal deficit from 2014–2015 onwards. Revenue mobilization has steadily

<sup>18</sup> ADB. 2018. *Macroeconomic Update Nepal*. Volume. 6, No.1, Manila.

<sup>19</sup> IMF. 2018. *Nepal: Recent Macro-Economic Developments*. Washington DC.

increased over time, but expenditure outperformed revenue particularly after 2016–2017. This fiscal deficit is likely to continue in 2017–2018 due to the fiscal transfer to local and provincial governments and election expenses.

**Table 6: Selected Macroeconomic Indicators, 2012-2013 – 2016-2017**

	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017 <sup>P</sup>
1. GDP growth in constant prices (%)	3.8	5.7	3.0	0.01	6.9
2. GDP (current prices, NRs trillion)	1.7	2.0	2.1	2.2	2.6
3. Inflation (%)	9.9	9.1	7.2	9.9	4.5
4. GDP growth in current prices (%)	10.8	14.2	9.5	10.5	15.7
5. Government revenue and grants (% of GDP)	19.5	20.6	20.8	23.2	24.7
6. Government expenditure and onlending (% of GDP)	18.8	20.0	21.8	23.7	30.2
7. Overall fiscal surplus (deficit) (% of GDP)	0.8	0.9	(0.7)	(0.3)	(5.4)
8. Remittances (% of GDP)	25.6	27.7	29.0	29.6	26.8

FY = fiscal year, GDP = gross domestic product, NRs = Nepal Rupee/s.

Note: p=preliminary estimate

Source: Asian Development Bank Macroeconomic Update (April 2018) and Ministry of Education, Science and Technology estimates.

26. Nepal's risk of debt distress is, however, considered low according to joint International Monetary Fund (IMF) and World Bank debt sustainability analysis. Nepal's public debt to GDP ratio continued to decline to 22% in 2015-2016 while other low-income countries have nearly 50%.<sup>20</sup> IMF Article IV consultation in 2017 recommends that fiscal policy should focus on higher and better quality public investment to facilitate post-earthquake reconstruction and medium-term growth while improving the institutional and administrative capacity to overcome the chronic under implementation of the budget. IMF also supports concessional donor support for high quality capital spending.

27. The level of government budget allocation for education has been growing in line with the expansion of the economy. The government expenditure on education is slightly below 4.0% in GDP for the last few years. Seemingly, 2017-2018 budget estimate is considerably lower than the 2016-2017 budget (Table 7), but because of the Local Government Operation Act, 2074, enacted in 2017, a series of public education services are delegated to the local level with budget. According to the Department of Education, estimated budget allocated for local level education service delivery is around NRs 80.8 billion, and the total budget allocated for education sector in Nepal is estimated as NRs 126.6 billion in 2017/18.

**Table 7: Government Allocation to Education**

(NRs billion)

	2014/2015 actual	2015/2016 actual	2016/2017 actual	2017/2018 revised
1. National budget	531	701	1,049	1,279
2. Education budget	79.8	90.7	109.4	45.8
3. Education budget (% of national budget)	15.0	12.9	10.4	(126.6) 3.6 (9.9)
4. Government education expenditure (% of GDP)	3.8	3.9	3.7	3.5
5. Share of school sector in government education Expenditure (%)	80.4	80.3	81.2	81.0

<sup>20</sup> IMF. 2017. *Staff Report for the 2017 Article IV Consultation*. Washington DC.

Note: Actual means based on Ministry of Finance final figures (not audited), and revised means (nearly final figures based on 9 months of actual expenditures). The percentage in the parenthesis in 2017/18 indicates the estimated proportion of education budget including the one allocated to local level (estimated as NRs 80.8 million). Source: Asian Development Bank estimates and Government of Nepal, Ministry of Finance. *Estimates of Expenditure: Redbook 2017/2018*. Kathmandu.

28. In FY2019, federal government education budget is estimated as NRs134.2 billion which will be shared by federal, provinces and local governments. The local governments use most of the budget for pre-primary and primary education as well as informal education. The federal government provides majority of subsidiary services to education and other education, such as education research. Among total federal education budget, 63.4% is allocated for local governments.

**Table 8: Federal Government Education Budget in FY2019**

NRs Billion	Federal	Provinces	Local	Total
1. Pre-primary and primary education	0.0	0.5	59.7	60.2
2. Informal education	10.0	2.0	25.4	37.4
3. Subsidiary services to education	33.6	0.3	0.0	33.9
4. Other education	2.6	0.1	0.0	2.7
5. Total	46.2	2.8	85.1	134.2

Source: Government of Nepal, Ministry of Finance. 2018. *Budget Speech of Fiscal Year 2018/19*. Kathmandu.

29. The Local Government Operation Act does not specify normative education financing formula, but grant funding scheme for basic and secondary education is currently discussed actively with the support from the United States Agency for International Development. While introduction of new act makes certain changes on estimating budget depending on the priority of each local government, but the school sector historically accounts for around 80% of the public education expenditure in the last few years (Table 7), and this stable trend is likely to continue in the future. Yet, the government of Nepal, in general, suffered from low utilization of capital expenditures (around 72%), and implementation capacity needs to be monitored.

30. Fiscal sustainability of the project will depend on (i) the availability of resources, and (ii) the priority assigned by the government for disaster resilient public school reconstruction. Since disaster reconstruction in education is high priority, the government will mobilize resources from at least three sources: (i) its own resources; (ii) funds from development partners; and (iii) contributions from the communities, through in-kind contributions to school reconstruction and maintenance. The partial recovery of expense is not anticipated because this investment is for public school in secondary education. The long-term sustainability of this project will depend on whether improving the access to quality education (i) leads to much higher labor market outcomes; (ii) increases the productivity of the labor force, leading to higher returns on school infrastructure investment; (iii) gradual growth in wages, leading to expand tax base; and (iv) magnitude and frequency of natural disaster, such as earthquake and floods, reducing the number of death and injuries through disaster resilient public school infrastructure.

31. While additional capital investment for resilient safe school construction is required, it does not necessarily restrict the fiscal space in the medium to long term perspective. This project aims to reconstruct and retrofit the existing schools, rather than increasing the number of new schools, and it will not trigger to have additional fiscal recurrent budget. Under the National Reconstruction Fund (NRF) in fiscal 2015–2016, NRs 6 billion is allocated for social sector (education and health) out of NRs74 billion, which is 8.1% of the NRF. Compared with the reconstruction budget assigned to the housing sector, which is around two thirds of the NRF in fiscal 2015–2016, the scale of the capital investment is not necessarily large.

32. In February 2018, MOEST expressed its commitment in the international funding conference of Global Partnership for Education to ramp up the budget for education up to 20% of the total national budget for maintaining its sustainability. Given the current proportion is around 10% (including the education expenditure allocated at local level) as shown in Table 7, this is not an easy task, but the government is committed to have continuity of providing compulsory primary education free of cost and make secondary education gradually free of cost in the budget speech 2017/18 which is in line with the constitution. According to the Human Development Report 2016, government expenditure on education in Nepal is 4.7% during 2010-2014. This is lower than 6% recommended by UNESCO, but the figure is higher than Bangladesh (2.0%), India (3.8%), Sri Lanka (1.6%) in the same region.

33. Since classroom construction cost item is reclassified into recurrent costs from 2011/12 onwards, capital expenditure accounts for almost 100% of the federal government MOEST budget (see Table 9). Until FY2018 when the new decentralized budget system is introduced, the recurrent budget has been steadily increased over time. While this project supports school reconstruction and retrofitting through investment lending, many of the other education support from development partners are pooled in education budget which contributed to increase the recurrent budget. Under the new budget system in FY2018, the total amount to be disbursed by federal government to local governments are indicated in the budget, but the breakdown into recurrent and capital expenditure for local governments will be stated in their respective budgets which are not available right now. The estimated budget in FY2019 is NRs46.2 billion for recurrent expenditure and NRs0.3 billion capital expenditure, and recurrent expenditure is increasing in new budget system at least for federal government level. For FY2019, NRs40.8 billion is funded by Government of Nepal and NRs2.2 billion is funded by grant and NRs3.5 billion is funded through loan.

**Table 9: Federal Government Recurrent and Capital Expenditure at MOEST**

NRs Billion	FY2015 actual	FY2016 actual	FY2017 actual	FY2018 revised
1. Recurrent expenditure	79.7	90.5	109.1	45.5
2. Capital expenditure	0.1	0.2	0.3	0.3
3. Total	79.8	90.7	109.4	45.8

Note: Actual means based on Ministry of Finance final figures (not audited), and revised means (nearly final figures based on 9 months of actual expenditures).

Source: Asian Development Bank estimates and Government of Nepal, Ministry of Finance. *Estimates of Expenditure: Redbook 2017/2018*. Kathmandu. Government of Nepal, Ministry of Finance. 2018. *Budget Speech of Fiscal Year 2018/19*. Kathmandu.

34. The budget execution rate at MOEST is more than 90% during FY2015–FY2017 (Table 10) which is considerably higher than 72% (average for FY2012–FY2017). The 2011/12 budget reclassification makes it easier for MOEST to utilize large part of education budget every year. The budget execution rate is lower in FY2018, but this is still based on the revised budget estimate and also influenced by the new budget system rather than interpreting it as sharp decline of the budget execution rate of MOEST.

**Table 10: Planned and Actual Budget Expenditure at MOEST**

NRs Billion	FY2015	FY2016	FY2017	FY2018
1. Planned estimate (recurrent expenditure)	85.86	98.47	116.13	65.71
2. Actual (recurrent expenditure)	79.74	90.45	109.10	45.53
3. Actual / Planned (% recurrent expenditure)	92.87	91.86	93.95	69.29
4. Planned estimate (capital expenditure)	0.17	0.17	0.23	0.41
5. Actual (capital expenditure)	0.10	0.23	0.34	0.32
6. Actual / Planned (% capital expenditure)	55.49	136.90	150.44	78.43

NRs Billion	FY2015	FY2016	FY2017	FY2018
7. Planned estimate (total expenditure)	86.03	98.64	116.36	66.12
8. Actual (total expenditure)	79.84	90.68	109.44	45.85
9. Actual / Planned (% , total expenditure)	92.80	91.93	94.05	69.34

FY = fiscal year, MOEST = Ministry of Education, Science and Technology.

Note: FY2018 is based on revised budget rather than actual.

Source: Asian Development Bank estimates and Government of Nepal, Ministry of Finance. *Estimates of Expenditure: Redbook 2017/2018*. Kathmandu. Government of Nepal, Ministry of Finance. 2018. *Budget Speech of Fiscal Year 2018/19*. Kathmandu.

35. The recurrent cost in standard sense is estimated around 70% of education budget through examining the budget code related to recurrent cost (mostly teacher salary) as summarized in Table 11. This is consistent with the level before 2011/12. The government can disburse capital investment cost to schools by the end of the fiscal year as recurrent cost, and schools can complete the physical construction works for the next fiscal year if the budget cannot be fully utilized within the fiscal year. In fact, more than 47% of education budget is released in the last four months,<sup>21</sup> and budget execution capacity needs to be strengthened.

**Table 11: Education Recurrent Cost**  
(NRs billion)

	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017
1. Primary education	20.1	21.5	25.9	28.9	30.8	47.2
2. Lower secondary/secondary	9.8	10.5	13.5	15.4	15.0	12.4
3. Other education	0.9	1.3	1.5	0.2	0.5	0.5
4. Teacher pension facilities	2.3	3.3	3.5	6.1	8.4	10.1
<b>Recurrent sub-total</b>	<b>33.0</b>	<b>36.6</b>	<b>44.4</b>	<b>50.5</b>	<b>54.7</b>	<b>70.2</b>
<b>Percentage of recurrent cost in total education budget (%)</b>	<b>63.5</b>	<b>70.3</b>	<b>66.1</b>	<b>72.7</b>	<b>67.0</b>	<b>72.9</b>

Note: Other education category includes non-formal education, special education and teacher record office.

Source: Government of Nepal, Ministry of Finance. *Estimates of Expenditure: Redbook 2017/2018*. Kathmandu.

36. **Financing Gap.** Significant financing gap of NRs 104.9 billion during 2016-2020 of capital investment remains for resilient safe school construction (Table 9), it does not necessarily restrict the fiscal space in the medium to long term perspective. This project aims to reconstruct and retrofit the existing schools, rather than increasing the number of new schools, and it will not trigger to have additional fiscal recurrent budget. As such, there will not be additional need for recurrent budget. However, the current level of operation and maintenance cost for school is not sufficient. Therefore, as part of policy dialogue within SSDP, the project will monitor if an appropriate level of budget, including operation and maintenance cost, is allocated to each targeted local government.

37. If the financing gap during 2016-2020 were to be fully funded through additional budget allocation, it would require less than 20% of government budget allocated to the education services during FY2016 – FY2020. This figure accounts for less than 1.0% of GDP.

<sup>21</sup> ADB. 2016. *Report and Recommendation of the President to the Board of Directors Proposed Results-Based Loan and Technical Assistance Grant Nepal: Supporting School Sector Development Plan (Program Expenditure)*. Manila.

**Table 9: Financing Gap During 2016 – 2020 (NRs billion)**

Year	GON	EEAP <sup>a</sup> and JFPR	DRSP <sup>a</sup>	JICA	India	Others	Total	PDRF <sup>a</sup>	Gap
<b>2016</b>		1.1				1.0	2.1	67.2	65.1
<b>2017</b>	5.4	2.2		1.2		1.0	9.8	52.9	43.1
<b>2018</b>	4.3	3.8	1.0	5.5	1.0	1.0	16.6	52.4	35.8
<b>2019</b>	9.1	2.7	5.9	5.6	2.0	1.0	26.3	5.9	(20.4)
<b>2020</b>	9.1	1.1	7.1	0.6	2.0	1.0	20.9	2.2	(18.7)
<b>Total</b>	<b>27.9</b>	<b>10.9</b>	<b>14.0</b>	<b>12.9</b>	<b>5.0</b>	<b>5.0</b>	<b>75.8</b>	<b>180.6</b>	<b>104.9</b>

DRSP = Disaster Resilience of Schools Project, EEAP = Emergency Earthquake Assistance Project, JFPR = Japan Fund for Poverty Reduction funded Disaster Risk Reduction and Livelihood Restoration for Earthquake Affected Areas, GON = Government of Nepal, JICA = Japan International Cooperation Agency, PDRF = Post Disaster Recovery Framework.

<sup>a</sup> EEAP includes United States Agency for International Development cofinancing (\$10 million) and DRSP funding up to FY 2020 is included.

Sources: Government of Nepal, National Reconstruction Authority, 2016. *Post Disaster Recovery Framework 2016-2020*. Kathmandu; Asian Development Bank estimates and communication with development partners.