

## ECONOMIC ANALYSIS

### A. Introduction

1. This analysis is for the processing of the results-based lending by the Asian Development Bank (ADB) for Supporting Fourth Primary Education Development Program. The Fourth Primary Education Development Program (FY2019–FY2023, PEDP4) follows several nationwide programs in the primary education subsector. The first PEDP (FY1997–FY2003) served as the organizing framework for the development of primary education nationwide. The PEDP2 (FY2004–FY2012) introduced the sector-wide approach (SWAp), with the Government of Bangladesh and the development partners working together to establish a coordinated and integrated program. The SWAp continued under the PEDP3 (FY2012–FY2018), which further reformed the subsector, including nationalizing registered nongovernment schools and introducing a competency-based curriculum. Given that the results-based lending program supports the financing and implementation of the PEDP4 under the SWAp, the analysis is based on the projected economic benefits and costs applied to the whole PEDP4.

2. As of 2017, the Bangladesh primary education system had enrolled 18.6 million students in about 127,000 schools and *madrasahs* (religious education schools) staffed with about 548,000 teachers. The net enrollment rate reached 98.0% and the repetition rate decreased to 6.1% in 2016. Dropout rates declined in all grades, and the cycle completion rate—the percentage of students reaching grade 5 and passing the Primary Education Completion Examination—improved from 60.2% in 2010 to 79.6% in 2016.<sup>1</sup> Bangladesh continues with gender parity in access to primary education—the gender parity index (GPI)<sup>2</sup> was 1.05 (1.02) for the gross (net) enrollment rate in 2016.<sup>3</sup>

3. With PEDP3 completed, the PEDP4 is being initiated in FY2019. In step with achieving Sustainable Development Goal 4, the PEDP4 is aligned with ADB’s country partnership strategy, 2016–2020 for Bangladesh, which continues ADB support to primary education.<sup>4</sup> The PEDP4 aims to achieve the government’s goals of increasing both participation in and quality of primary education as highlighted in the (i) National Education Policy (2010); (ii) Seventh Five-Year Plan, FY2016–FY2020; and (iii) Agenda for Sustainable Development (2030).<sup>5</sup> Key focus areas of the PEDP4 are to improve the quality of primary education and increase access and participation, especially for those children living in far-flung areas.

### B. Rationale

4. Developing the primary education system is a long-term process. Despite achievements made by previous interventions, the PEDP4 is needed to tackle remaining issues, especially the lack of overall quality and relevance of primary education, inequitable access, and weak governance and management. Only 65% and 39% of grade 3 students grasp grade-level Bangla and math, and even fewer grade 5 students do so (23% and 10%). School-age children who are out of school (2.5 million or 11% aged 8–14) are more prevalent in poor families and

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<sup>1</sup> Government of Bangladesh, Directorate of Primary Education. 2016. *Annual Sector Performance Report*. Dhaka.

<sup>2</sup> GPI is the ratio of female to male values of a given indicator.

<sup>3</sup> GPI within 0.97–1.03 for net enrollment suggests gender parity as per the United Nations Educational, Scientific and Cultural Organization (UNESCO).

<sup>4</sup> ADB. 2016. *Country Partnership Strategy: Bangladesh, 2016–2020*. Manila.

<sup>5</sup> Government of Bangladesh, National Planning Commission. 2015. *Seventh Five-Year Plan, FY2016–FY2020*. Dhaka; Government of Bangladesh, Ministry of Education. 2010. *National Education Policy*. Dhaka; United Nations. 2015. *Transforming Our World: The 2030 Agenda for Sustainable Development*. New York.

those who live in disadvantaged locations like urban slums. Disparities in school access and participation are also substantial in the wetland (*haor*) and river island (*char*) areas, coastal zones, and northern districts.

5. The PEDP4 will (i) upgrade school infrastructure; (ii) recruit and deploy more teachers; (iii) transform the current in-service teacher training into continuous professional development; (iv) revise the curriculum and enrich teaching and learning resources; (v) reform examinations and assessments; (vi) scale up the education service to out-of-school children (OOSC); and (vii) strengthen autonomy and capacity of schools and subdistricts (*upazilas*) with performance-linked incentives. The expected outcome will be a more efficient, inclusive, and equitable primary education system. This will lead to better labor force quality and social cohesion in Bangladesh, and thereby generate economic gains.

### C. Cost–Benefit Analysis

6. The economic analysis for the PEDP4 assesses the expected benefits and costs related to the program by comparing the additional costs with the additional benefits that will accrue as a result of the PEDP4. The analysis builds on the most recent macroeconomic and demographic projections that have an impact on the overall economic viability of the program. The analysis was conducted on the whole PEDP4, estimated to cost \$15.1 billion, of which \$13.7 billion or 90.8% will be financed by the government.

7. **General assumptions.** The following approach and assumptions were used:

- (i) The average exchange rate of Tk83 = \$1.00 is used for converting foreign exchange costs to local currency equivalents for FY2019–FY2023.
- (ii) All prices are valued in domestic price numeracies in current prices.
- (iii) Price contingencies, physical contingencies, and interests are excluded in the calculation of the economic internal rate of return (EIRR).
- (iv) Taxes and duties are excluded because they represent transfer payments.
- (v) A 6% economic discount rate is used.
- (vi) The economic life of the program is assumed at 25 years.

8. **Benefits.** All school-age children will be the primary beneficiaries. With the PEDP4, benefits may come from three sources: (i) a larger number of primary education completers whose wages are higher than those of non-completers; (ii) higher wage premiums for all basic education completers as a result of better-quality education; and (iii) fewer dropouts and repetitions, which in turn lessen the wastage of resources, both private and public.

9. **Quantity benefits.** The benefits for additional students under the PEDP4 are calculated based on the number of additional students who complete grade 5, beginning in the second year of the PEDP4 until the end of the program. This is estimated based on the (i) projected age 6 population each year; (ii) gross intake rate rising from 1.12 in 2017 to 1.24 by 2022; (iii) promotion, repetition, and dropout rate matrix based on the latest data (in 2015); and (iv) expected increase of survival rate from 83% in 2017 to 85% by 2022.

10. For each year, the annual wage premium for each student who completes grade 5 is 90% of the difference between the average wage of grade 5 completers and that of non-completers. The latest data from the 2010 Household Income and Expenditure Survey (HIES) are used. It is assumed that the average wages for both grade 5 completers and non-completers increase annually by the inflation rate, and that the benefit stream begins from the second year and continues until 2043.

11. One limitation of this analysis is that the wage premium of primary education completion underestimates the return to primary education, as the secondary and tertiary completers also need to go through primary education. Based on the 2010 HIES data, the average earning of primary completers (Tk49,471) is 54.6% lower than that of secondary completers (Tk76,483), while the average earning of those who have completed tertiary education is Tk173,175.

12. **Quality benefits.** On top of the quantity benefits, the PEDP4 is expected to increase the education quality. This will facilitate the learning of cognitive skills and lead to higher productivity, which is likely to increase wage rates in the labor market (“quality wage premium”), as shown by a large literature on the link between education quality and labor productivity (e.g., Hanushek, 1996).<sup>6</sup> It is assumed that the quality premium on wage is 3% of the average wage rate in the absence of the PEDP4.<sup>7</sup> This is a conservative assumption based on other comparable projects. The quality wage premium is assumed at 5% for the forthcoming third tranche of the Secondary Education Sector Investment Program in Bangladesh. In Nepal, the quality wage premium for the ongoing School Sector Development Program was estimated at 5.5% (ADB, 2016). The sensitivity analysis assesses the internal rate of return under a lower wage premium of 2%.

14. **Efficiency benefits.** This refers to the benefits resulting from fewer repetitions, which in turn reduces delays in grade 5 completion. A reconstructed cohort analysis is undertaken to estimate the number of years required to produce a primary school completer. With the increase in promotions, decrease in repetitions, and reduction in dropout rates anticipated under the PEDP4, the number of years expected to produce a primary school graduate under the PEDP4 is 5.80, in contrast to the 6.18 without the PEDP4.<sup>8</sup> In this regard, each student who starts his/her study under the PEDP4 will save 0.38 years on average to complete his/her primary schooling.<sup>9</sup> The total efficiency gain benefit (thanks to shorter completion time) in dollar terms for all completers is then computed as:

Efficiency gains benefit = the number of primary completers x school years saved thanks to shorter completion time x total school cost,

where the total school cost is the cost per child incurred by the government plus the opportunity cost of going to school and the household expenditure on education. Since this gain is for the program period of 5 years only, one could argue that this is a lower-bound gain since the efficiency gains might be maintained in the primary education system even after the end of the program.

15. **Costs.** Total costs include public investments, private investments, and opportunity costs to households. Public investments are additional costs incurred by the government because of the PEDP4 (on top of primary school operation costs in the absence of the PEDP4). Private investments include the direct costs borne by households as a result of increased enrollment (the additional enrollment times private cost per student).<sup>10</sup> The opportunity cost of

<sup>6</sup> E. Hanushek, The Economics of Schooling: Production and Efficiency in Public Schools, *Journal of Economic Literature*, 24(3), 1996.

<sup>7</sup> We assume a wage premium of 1.5% for graduates in the first year of the program and 3.0% for those who graduate in subsequent years of the program.

<sup>8</sup> This is based on the Annual Sector Performance Report (2017).

<sup>9</sup> The saving in school years for primary school completers is assumed to be 0.08 in 2019, 0.15 in 2020, 0.23 in 2021, and 0.30 in 2022.

<sup>10</sup> The private cost per student per year can be found in the 2010 HIES, which includes educational expenses incurred by households with children enrolled in primary schools.

educating a child for a year is assumed to be 50% of the annual wage rate for an adult with less than primary education. The wage rate is calculated based on the 2010 HIES. The total opportunity cost for additional enrollment in a year is the number of additional enrollment for that year multiplied by the annual opportunity cost per student.

16. Economic prices of investment costs and recurrent costs are estimated by converting the financial prices with a shadow exchange rate factor of 1.07 for traded goods (net of taxes and duties), a factor of 1.0 for non-traded good, a shadow wage rate factor of 1.0 for skilled labor, and a shadow wage rate factor of 0.75 for unskilled labor.<sup>11</sup>

17. **Economic internal rate of return.** Based on a discount rate of 6% for the benefit and cost streams described above, an economic rate of return analysis shows that the PEDP4 interventions are economically sensible. The EIRR of the entire program is estimated at 17.5%, indicating an economically sound investment (Table 1).

**Table 1: Economic Internal Rate of Return Based on Base-Case Scenario (Tk million)**

Year	Costs			Benefits				Net Benefit
	Additional Public Investment	Private and Opportunity Costs	Total	Quantity	Quality	Efficiency	Total	
1	32,262	2,550	34,812	-	-	10,772	10,772	(24,040)
2	74,838	8,924	83,762	67	7,911	21,481	29,459	(54,303)
3	90,461	18,811	109,273	466	16,327	31,797	48,590	(60,683)
4	91,468	32,837	124,304	1,217	25,144	45,242	71,603	(52,701)
5	84,475	68,521	152,996	2,464	35,015	61,501	98,980	(54,016)
6	10,011	-	10,011	5,024	46,211	-	51,235	41,224
7	10,011	-	10,011	5,326	48,984	-	54,309	44,299
8	10,011	-	10,011	5,645	51,923	-	57,568	47,557
9	10,011	-	10,011	5,984	55,038	-	61,022	51,011
10	10,011	-	10,011	6,343	58,341	-	64,683	54,673
11–25	150,164	-	150,164	156,492	1,439,412	-	1,595,905	1,445,741
PV	394,374	103,355	497,729	74,092	718,373	137,771	930,236	432,508
<b>NPV at 6%=432,508</b>							<b>EIRR=17.5%</b>	

( ) = negative, - = not applicable, EIRR = economic internal rate of return, PV = present value, NPV = net present value.

Source: Asian Development Bank estimates based on program data and projections.

#### D. Sensitivity Analysis

18. A sensitivity analysis examines the impact of downside risks on the EIRR (Table 2). Six alternative risk scenarios are considered: (i) quality premium reduced to 2%; (ii) quantity benefit reduced by 15%; (iii) efficiency benefit reduced by 15%; (iv) public investment cost inflated by 15%; (v) both quantity and efficiency benefits reduced by 15%; and (vi) quantity and efficiency benefits reduced by 15% and at the same time public investment cost inflated by 15%. In all cases, the EIRRs are more than 11.7%, which is above the threshold value of 6.0% for social sector projects. It shows that the program is a sound investment, but strong emphasis should be placed on smooth implementation.

<sup>11</sup> Conversion factors for the shadow exchange rate factor and shadow wage rate factor are based on recently approved ADB-financed projects in Bangladesh: (i) ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Loan to Bangladesh for the Third Urban Governance and Infrastructure Improvement (Sector) Project*. Manila; and (ii) ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranches Financing Facility to Bangladesh for the Skills for Employment Investment Program*. Manila.

**Table 2: Sensitivity Analysis**

Scenario	Sensitivity Parameter	Variation	EIRR	NPV (Tk million)
1	Base case		17.5%	432,508
2	Quality premium	-1%	11.7%	193,050
3	Quantity benefit	-15%	17.3%	421,394
4	Efficiency benefit	-15%	16.4%	411,842
5	Public investment	+15%	14.8%	373,352
6	Both quantity and efficiency benefits reduced	-15%	16.2%	400,728
7	Both quantity and efficiency benefits reduced and public investment increased	-15% +15%	13.8%	341,572

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

Source: Asian Development Bank estimates based on project data and projections.

## E. Distributional Analysis

19. Considerable disparities in primary education access and quality continue to exist across income groups and geographical locations. Based on the 2010 HIES, the primary net attendance rate was 77% for the poorest 20% of households, lower than the 88% net attendance rate recorded for the richest 20%. It was also observed that children aged 6–10 from the poorest households are less likely to attend primary school than those from the richest households. Moreover, education divides in terms of primary cycle completion rates and learning outcomes between regions (urban, urban slum, rural, and remote areas) and different income classes persist.

20. The 2011 population census data also reveal the substantial geographical variation in OOSC. Across the seven divisions, the average rate of school exclusion varied from 19.7% in Khulna to 26.6% in Sylhet. The disparity at the lower end of the geographical areas was even more marked—the average rate of school exclusion for the 10 lowest participation districts was 28.2%, compared with 17.5% for the 10 highest participation districts.

**Table 3: Range of National Attendance Rates between Top and Bottom 20% of Households by Consumption**

	HIES (2010) (Baseline)			EHS (2014)		
	Boys	Girls	Total	Boys	Girls	Total
Top 20%	88%	87%	88%	88%	88%	88%
Bottom 20%	73%	82%	77%	77%	85%	80%
Difference	15%	5%	11%	12%	3%	8%

EHS = Education Household Survey, HIES = Household Income and Expenditure Survey.

Source: Government of Bangladesh, Directorate of Primary Education. 2016. *Annual Sector Performance Report*. Dhaka.

21. The PEDP4 tackles the distribution issues through several measures: (i) provide access to primary education to at least 65,000 OOSC; (ii) strengthen the school level improvement plan and *upazila* primary education plan, which will help schools in disadvantaged areas to improve performance in enrollment and retention; and (iii) construct additional, disaster risk-resilient school infrastructure, especially in disaster-prone areas. In addition, the executing agency (Ministry of Primary and Mass Education) is implementing the parallel school feeding program and stipend program (targeting poor households), which will top up the efforts of the PEDP4 in promoting access and participation.