

## ECONOMIC ANALYSIS

### A. Economic Rationale

1. The proposed additional financing of the Urban Primary Health Care Services Delivery Project of the Asian Development Bank (ADB) builds on its ongoing third phase, which intends to improve the health of the urban poor of Bangladesh by providing them with improved access to effective, efficient, and sustainable primary health care (PHC) services.<sup>1</sup> Its major goal is to ensure that at least 30% of the services will be provided to the poor, primarily free. Local government bodies, though mandated to offer PHC services to the urban poor, do not have the financial, technical, or management capacity to do so. The project is critical to sustain and expand services in collaboration with local government bodies and nongovernment organizations.

2. **Rapid urbanization.** From the start of the project in 1990 to 2017, the proportion of the population residing in urban areas nearly doubled from 19.8% to 35.6%.<sup>2</sup> The urban population is expected to exceed 100 million by 2040, which will make up most of the population. Despite enormous contributions to national economic growth, urban areas make large demands on health services. Because of the rapid increase in the proportion of urban residents under the poverty level, 70% of the poor in urban areas reside in slum areas. Thus, the urban poor suffer from overcrowding as well as unhygienic and poor living conditions, which adversely affect the health and productivity of day laborers, rickshaw pullers, and garment factory workers. The lack of quality, modern, and publicly sponsored PHC services in urban areas exacerbates the vulnerable status of the poor as they seek health care from informal providers and low-quality unlicensed private clinics. This situation is worsened by the limited reach and inadequate PHC services in the slums, social exclusion of slum dwellers, hidden and floating slum populations, and weak social fabric among urban migrants.

3. **Very poor access to basic health services for the urban poor.** While health indicators for Bangladesh have improved between 2000 to 2015, large inequities in the health status of the urban population persist.<sup>3</sup> For example, children under 5 years of age in slums are twice as likely to die than those in rural areas. Two-thirds of these deaths could be avoided if timely and appropriate PHC services were available. Antenatal care, skilled birth attendance, and full childhood vaccine coverage are quite low in urban slums. The current project covers 10 city corporations and four municipalities with an estimated total population of 7.7 million at the initial stage in 2012—about 14% of the country's urban population. A total of 16.7 million are expected to be covered by expanding the project's activities to additional urban local bodies, bringing the coverage of the country's urban population to around 30%.

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<sup>1</sup> ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Loan, Technical Assistance Grant, and Administration of Grant to the People's Republic of Bangladesh for the Urban Primary Health Care Services Delivery Project*. Manila.

<sup>2</sup> United Nations Population Division. 2014. *World Urbanization Prospects*. Manila. Based on a 2017 population estimate of 164,827,718. See Worldometers. Bangladesh Population. [www.worldometers.info/world-population/bangladesh-population](http://www.worldometers.info/world-population/bangladesh-population) (accessed 9 May 2017).

<sup>3</sup> From 1999–2003 to 2010–2014, under-five mortality declined from 88 to 46 deaths per 1,000 live births and the country achieved the Millennium Development Goal 4 target (48 deaths per 1,000 live births) (National Institute of Population and Training, Mitra and Associates, and ICF International. 2015. *Bangladesh Demographic and Health Survey 2014: Key Indicators*. Dhaka; and Rockville, United States). Maternal mortality also declined by 56% from 399 to 176 deaths per 100,000 live births from 2000 to 2015, close to achieving the Millennium Development Goal 5 target for maternal mortality (143 deaths per 100,000 live births) (World Health Organization. 2015. *Trends in Maternal Mortality, 1990 to 2015: Estimates by WHO, UNICEF, UNFPA, World Bank Group, and the United Nations Population Division*. Geneva).

4. **Economics of improved health.** While improved health from better access to basic PHC services brings clear benefits from the reduction in pain and suffering, considerable social and economic returns on investment can be anticipated from health care cost savings (less spending on curative care) and productivity gains (more healthy days available for productive work). These gains are tangible benefits of developments that produce a population with better health. After making reasonable assumptions about how much the poor may save through access to free and quality services, and considering the increased number of healthy days, it is possible to calculate a monetary benefit to the health activities that result from the project investments. An economic analysis to calculate such benefit was undertaken in accordance with ADB's *Guidelines for the Economic Analysis of Project and Handbook for the Economic Analysis of Health Sector Projects*.<sup>4</sup>

## B. Economic Parameters and Assumptions

5. The economic analysis covers the 20-year period, inclusive of the project life from 2018 to 2023, during which implementation is planned to take place. Economic benefits and costs are expressed in United States dollars at constant 2017 prices. The costs to society are the capital and recurrent costs associated with project implementation and after the implementation period. To determine the economic efficiency of the project, a quantification of economic benefits—estimation of its economic internal rate of return (EIRR)—is calculated for 2018–2037 by representing benefits as productivity gains and health care savings by target beneficiaries resulting from the PHC services compared with project costs in producing them. With the inclusion of 20 additional partnership areas, the project will contribute significantly to increasing the access of the urban poor population to quality PHC services. It is expected that the project will have a positive economic return and strengthened PHC services, which will have a total of 16.7 million beneficiaries availing of PHC services in 2018.

## C. Economic Benefits: Assumptions

6. Table 1 shows project benefits: (i) improved productivity from lower incidence and severity of illness, resulting in fewer lost days of work; (ii) improved productivity from reduced mortality, particularly among mothers and newborn infants, with fewer days of work lost to caring for sick relatives; (iii) consumption benefits derived by individuals from feeling healthier and benefiting from slightly higher net incomes from savings of avoided user fees; and (iv) reduced household expenditures as a result of savings from lower medical care and other supplementary fees likely to be derived from the project. In calculating the EIRR, these four categories of benefits are used; and other benefits that are more difficult to quantify were included qualitatively.

**Table 1: Project Benefits**

Item	Assumptions of Benefits
Effects of reduced morbidity on productivity	Fewer days lost to illness by workers of family members caring for the ill Fewer days of productivity temporarily reduced by either slow or no work Fewer days of lower productivity from permanent disability
Effects of reduced mortality on productivity	Fewer work days lost through premature death Less family time lost to family funerals (e.g., making burial arrangements)
Consumption benefits	Expanded leisure Slightly higher net household income from lower fees
Reduced household expenditures	Savings from medical care (e.g., user fees, drugs, and travel and waiting times) Supplementary fees (e.g., in cases of malaria and diarrhea)

Source: Asian Development Bank.

<sup>4</sup> ADB. 2017. *Guidelines for the Economic Analysis of Projects*. Manila; and ADB. 2000. *Handbook for the Economic Analysis of Health Sector Projects*. Manila.

7. The human capital approach regards health improvements from targeted expansions of health services as an investment in human capital. It postulates that human capital grows when health improvements increase the future earnings of those receiving enhanced health services by increasing the supply of labor, which reflects reduced rates of morbidity and mortality. Changes in the value of human capital then are measured using changes in expected lifetime earnings through changes in the productivity of labor from reduced rates of morbidity and mortality. The changing rates of morbidity and mortality are reflected in changes in the total number of disability-adjusted life years (DALYs) experienced by the target population.

8. The beneficiary population in the target area is about 16.7 million, and 21.3% of the urban population is below the upper poor threshold.<sup>5</sup> Some 80% of the urban poor is expected to be served under this additional financing. Health care services offered by the current project are expected to reduce the burden of out-of-pocket health expenditure for the poor. For estimating the EIRR, two types of economic benefits are expected: (i) savings from reduced prevailing household out-of-pocket expenditure for outpatient care provided by hospitals and varied outpatient facilities and (ii) economic benefits resulting from DALYs averted. Factors influencing health care cost savings and gains from DALYs are discussed below.

9. **Health care cost savings.** Prevailing out-of-pocket expenditure of the project beneficiaries on outpatient care is expected to be their health care savings. Using Bangladesh National Health Accounts, health care savings have been derived by adding 90.0% of the household out-of-pocket expenditure on hospital outpatient care; 90.0% of the ambulatory health care; 21.5% of ancillary care; and 3.5% as diagnostic costs from retailers.<sup>6</sup> In 2015, health care cost savings were \$4.7 per person, which have been extrapolated to estimate health care cost savings until 2037, applying a 15.0% annual growth rate in health outlay (Table 2).

**Table 2: Per Capita Out-of-Pocket Expenditure, 2015–2018 (\$)**

Providers	2012	2013	2014	2015	2016	2017	2018
Hospitals – Inpatient	1.72	2.32	2.58	2.78	3.20	3.68	4.23
Hospitals – Outpatient	0.43	0.40	0.49	0.55	0.64	0.73	0.84
Providers of ambulatory health care	1.99	2.40	2.77	3.21	3.69	4.24	4.88
Providers of ancillary services	1.29	1.57	1.75	1.96	2.26	2.60	2.99
Retailers and providers of medical goods	10.53	11.82	13.53	15.56	17.90	20.58	23.67
<b>Health Care Cost Savings</b>	<b>3.06</b>	<b>3.55</b>	<b>4.11</b>	<b>4.73</b>	<b>5.44</b>	<b>6.25</b>	<b>7.19</b>

Source: Asian Development Bank estimates.

10. **Disability-adjusted life year savings.** Savings from DALYs averted have been calculated considering the urban population ratio as an indicator of the percentage of total DALYs to estimate the potential benefit.<sup>7</sup> The DALYs of nine causes of diseases the project will focus on through its intervention, were extracted, and constitute about 87% of total urban DALYs.<sup>8</sup> The DALYs per urban population per year have been computed using the total urban population and calculated DALYs. To calculate the number of DALYs averted, a conservative number of 15 day's

<sup>5</sup> Government of Bangladesh, Bangladesh Bureau of Statistics. 2011. *Report of the Household Income and Expenditure Survey, 2010*. Dhaka.

<sup>6</sup> Since the project will target 80% of the urban poor for providing health care services, these fractions also correspond to those targeted poor. The sources of information, calculation, and respective ratios are based on Bangladesh National Health Accounts, 1997–2015 (2017).

<sup>7</sup> Data on DALYs for Bangladesh in 2015 are collected from the World Health Organization Department of Information and Evidence and Research ([http://www.who.int/healthinfo/global\\_burden\\_disease/estimates/en/index1.html](http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html)).

<sup>8</sup> The nine diseases are (i) tuberculosis, (ii) HIV/AIDS, (iii) diarrheal diseases, (iv) parasitic and vector diseases, (v) lower respiratory infections, (vi) maternal conditions, (vii) neonatal conditions, (viii) nutritional deficiencies, and (ix) noncommunicable diseases.

income of the target beneficiaries is used as a deflator to obtain the total number of DALYs averted every year.<sup>9</sup> Finally, the productivity from DALYs averted has been calculated for the identified poor who will be beneficiaries of the project.

#### **D. Economic Costs: Assumptions**

11. Cost estimates included in the analysis are classified as (i) investment costs, which include the cost of constructing and upgrading PHC facilities, purchasing equipment, installing information technology-based systems, and providing training; (ii) maintenance, replacement, and repair costs, which include the costs of maintaining PHC facilities and restocking supplies; and (iii) operating costs, which include administration, wages, transport, and utilities. For economic analysis, the total project cost is estimated at \$108 million after excluding taxes, interest charges, and price contingencies from the total cost of \$142 million.

12. Taxes and duties are excluded because they represent transfer payments. Interest charges accrued during the project implementation are not included in the capital cost in the project economic analysis as the cost of committing capital to the project is covered by discounting. Price contingencies are excluded from the economic cost of the project as economic returns are measured in constant prices. However, physical contingency is included in the economic costs. Following ADB's new guidelines for the economic analysis of social sector projects, a 6.0% economic discount rate has been used. The economic prices of investment costs and recurrent costs are estimated by converting the financial prices with a factor of 1.0 for traded goods, a factor of 0.9 for non-traded goods, and a shadow wage factor of 1.03 for unskilled labor.<sup>10</sup>

#### **E. Project Economic Internal Rate of Return**

13. The cost–benefit analysis indicates that strong benefits will likely accrue from health care cost savings and increased productivity of the urban poor in the project areas. Improving the quality of PHC services and strengthening governance will contribute significantly to improving the health conditions of the target population. Overall, the project will contribute significantly to improving the health status of the urban poor, strengthening health systems, and making other improvement in the urban PHC system, all of which are expected to have a positive economic return for the larger Bangladesh urban population. These improvements are reflected in the resulting EIRR of 9.5% and a net present value of \$8.5 million, which indicate that the project is economically viable (Table 3). Moreover, the cost per DALY averted for the project for the 20 years is estimated at \$2.68.

#### **F. Sensitivity Analysis**

14. An analysis was undertaken to test the sensitivity of the estimated EIRR to adverse changes in key variables and to confirm economic viability under unfavorable conditions. Using the least possible target urban population as the base scenario, the assumptions for key variables were (i) a 20% increase in project cost and (ii) a 20% reduction in benefits measured in loss of productivity. The results indicate that while the economic efficiency of the project is sensitive to changes in assumptions, the project still yields a healthy rate of return greater than 6% with significant adverse changes to benefits but fails to yield the required rate of return in case of a significant increase in project costs (Table 4). The cost per DALY averted over 20 years is \$2.52–

<sup>9</sup> In the economic analysis of the original project, 1 month's income was used as the deflator to obtain the monetary value in productivity gains per DALY averted.

<sup>10</sup> These standard conversion factors were used in the economic and financial analysis of the project completion report. ADB. 2017. *Completion Report: Post-Literacy and Continuing Education Project in Bangladesh*. Manila.

\$2.69.

**Table 3: Economic Internal Rate of Return**

Year	Target Beneficiaries (million)			Economic Benefits (\$ million)			Economic Costs (\$ million)			Net (Cost) Benefits	DALYs Averted (No.)	Cost per DALY Averted (\$)
	Total Population	Poor	Identified Poor	Health Care Savings	Productivity from DALYs Averted	Total Benefits	Investment cost	Recurrent Cost	Total Cost			
2018	16.7	3.3	2.7	0.0	0.0	0.0	(4.8)	(7.1)	(11.9)	(11.9)	3.6	3.3
2019	17.2	3.4	2.8	16.2	1.8	18.0	(8.8)	(12.4)	(21.2)	(3.1)	3.7	5.7
2020	17.8	3.6	2.8	15.8	1.8	17.5	(11.5)	(11.0)	(22.5)	(5.0)	3.9	5.9
2021	18.3	3.7	2.9	15.5	1.7	17.2	(6.9)	(11.1)	(18.0)	(0.8)	4.0	4.5
2022	18.9	3.8	3.0	15.2	1.7	16.9	(3.6)	(13.2)	(16.8)	0.1	4.1	4.1
2023	19.5	3.9	3.1	15.0	1.7	16.6	0.0	(15.0)	(15.0)	1.6	4.2	3.6
2024	20.1	4.0	3.2	14.7	1.6	16.3	0.0	(14.3)	(14.3)	2.0	4.4	3.3
2025	20.7	4.1	3.3	14.4	1.6	16.0	0.0	(13.6)	(13.6)	2.4	4.5	3.0
2026	21.4	4.3	3.4	14.3	1.6	15.9	0.0	(13.1)	(13.1)	2.8	4.6	2.8
2027	22.0	4.4	3.5	14.2	1.6	15.8	0.0	(12.6)	(12.6)	3.2	4.8	2.6
2028	22.7	4.5	3.6	14.1	1.6	15.6	0.0	(12.1)	(12.1)	3.5	4.9	2.5
2029	23.4	4.7	3.7	14.0	1.6	15.5	0.0	(11.7)	(11.7)	3.8	5.1	2.3
2030	24.2	4.8	3.9	13.8	1.5	15.4	0.0	(11.2)	(11.2)	4.2	5.2	2.1
2031	24.9	5.0	4.0	13.9	1.5	15.4	0.0	(10.9)	(10.9)	4.5	5.4	2.0
2032	25.7	5.1	4.1	13.9	1.5	15.4	0.0	(10.6)	(10.6)	4.8	5.6	1.9
2033	26.5	5.3	4.2	13.9	1.5	15.4	0.0	(10.3)	(10.3)	5.2	5.7	1.8
2034	27.3	5.5	4.4	13.9	1.5	15.5	0.0	(10.0)	(10.0)	5.5	5.9	1.7
2035	28.2	5.6	4.5	13.9	1.6	15.5	0.0	(9.7)	(9.7)	5.8	6.1	1.6
2036	29.1	5.8	4.7	14.1	1.6	15.6	0.0	(9.5)	(9.5)	6.2	6.3	1.5
2037	30.0	6.0	4.8	14.2	1.6	15.8	0.0	(9.3)	(9.3)	6.5	6.5	1.4
<b>Total</b>							<b>(35.6)</b>	<b>(228.7)</b>	<b>(264.3)</b>	<b>41.2</b>	<b>98.6</b>	<b>\$2.68</b>
<b>NPV (\$ million)</b>												<b>8.50</b>
<b>EIRR (%)</b>												<b>9.46</b>

DALY = disability adjusted life year, EIRR = economic internal rate of return, NPV = net present value.

Source: Asian Development Bank estimates.

**Table 4: Sensitivity Analysis of Economic Internal Rate of Return and Cost-Effectiveness Analysis**

Item	Base Scenario	Scenario 1: 20% Increase in Project Cost	Scenario 2: 20% Decrease in Benefits Measured in DALYs Averted
NPV (\$ million)	8.5	-6.66	5.1
EIRR (%)	9.5	4.0	8.1
Cost per DALY averted over a period of 20 years (\$)	2.68	2.69	2.52

DALY = disability adjusted life year, EIRR = economic internal rate of return, NPV = net present value.

Source: Asian Development Bank estimates.