

ECONOMIC ANALYSIS

A. Project Background

1. The proposed Asian Development Bank (ADB) additional financing for the Health System Enhancement Project will support the scaling up of the ongoing project while meeting the government's urgent request for coronavirus disease (COVID-19) response financing. Approved on 23 October 2018, the ongoing project allocated \$60 million to improve the efficiency, equity, and responsiveness of the primary health care (PHC) system of Sri Lanka. Under the proposed additional financing, a further \$123 million will be allocated to the project to (i) continue the support to enhance primary health care and strengthen disease surveillance as planned under the ongoing project; (ii) provide additional support to further improve the access to a more comprehensive, higher quality package of primary and secondary care services in Central, North Central, Sabaragamuwa, and Uva provinces and scale up e-learning in the health sector across the country; and (iii) improve the government's response capacity to better address the ongoing devastating COVID-19 pandemic.

B. Economic Rationale

2. Investing in PHC is explicitly recognized as the most inclusive, efficient, equitable, and cost-effective approach to increasing physical and mental health of people across all levels and improving health care performance. In Sri Lanka, although the universal health coverage has been achieved, the health financing on PHC remains low, which is accounting for only on average 15% of the curative health budget. Inadequate PHC resources generates system inefficiencies and losses to both patients and the public health system. While PHC facilities are being underutilized and demand for curative care is shifting from PHC to other levels of hospitals, secondary and tertiary care hospitals then get overburdened and treatment costs rise. With the introduction of the shared care cluster model, the ongoing project and the proposed additional financing support the government¹ in scaling up PHC in the four most deprived provinces² to increase the access to more comprehensive care including secondary care services through the referral mechanism. This health system reform improves the efficiency of service delivery while redistributing the existing patient load from the large hospitals to PHC facilities.

3. The COVID-19 pandemic has created unprecedented rapid demand for health care since early 2020. Sri Lanka remains at the cluster spreading level, resulting in 351,533 cases and 5,935 deaths as of 15 August 2021.³ Compared to the first and second waves, COVID-19 during the ongoing third wave (starting from 15th April 2021) has been spreading rapidly, resulting in a huge

¹ Implementation of the shared care cluster model is also supported by the World Bank.

² The targeted four provinces are Central, North Central, Sabaragamuwa, and Uva. These provinces represent 35% of the country's population and 5.5% of the national population in poverty. Each province has an agriculture-oriented economy, contributing approximately 41% of gross domestic product. All four provinces are prone to natural disasters (droughts, floods, and landslides) which negatively affect the main economic activity of each province. Nuwara Eliya (Central province) and Moneragala (Uva province) are identified as the poorest performing in terms of health and nutrition. Maternal deaths are comparatively higher in Central province. Considering the said socioeconomic factors, these four provinces are comparatively vulnerable. (Department of Census and Statistics, 2018. *Household Income and Expenditure Survey 2016*. Colombo; Department of Census and Statistics. 2012. *Population Census 2011*. Colombo; Central Bank of Sri Lanka. 2020. *Economic and Social Statistics of Sri Lanka*. Colombo; United Nations Children's Fund and Government of Sri Lanka, Ministry of Health. 2015. *Combating Malnutrition through Multisectoral Nutrition Programming: A Case Study from Sri Lanka*. Colombo; and Government of Sri Lanka, Ministry of Health. 2018. *Annual Health Statistics 2018*. Colombo).

³ Government of Sri Lanka, Ministry of Health, Epidemiology Unit. 2021. [COVID-19 Epidemiology in Sri Lanka. Colombo \(as of 15 August 2021\)](#). Colombo.

burden on the public health system. The Ministry of Health thus prepared the COVID-19 Sri Lanka Strategic Preparedness and Response Plan in 2020, and later updated it with the third wave impact in 2021. The plan focuses on 10 strategic areas⁴ that address preventing, detecting, and responding to the COVID-19 threat. ADB is supporting the government emergency COVID-19 response plan through the initial allocation of \$15 million in 2020 and the proposed additional financing in 2021. Scaling up the capacity of selected secondary and tertiary care hospitals to better manage COVID-19 patients by providing emergency medical equipment; increasing access to intensive care units, high dependency units, and emergency treatment unit beds; expanding access to oxygen; and procuring ambulances for home care are key areas of ADB investment, which covers the entire country. This investment brings multiple benefits to the country, including reducing the spread of the disease, increasing access to comprehensive essential ward care for COVID-19 patients, reducing the patient mobilizing time by enhancing ambulance services, improving the distance-learning infrastructure, developing distance-learning platforms including e-learning modules related to COVID-19, and increasing system efficiency. Consequently, the country can avert disease, deaths, disabilities, or critical cases, which will reduce the loss of productivity and hospital costs. The primary and secondary care investment proposed under the additional financing is also expected to serve COVID-19 patients. Investing in sewerage systems of PHC facilities will reduce the negative externalities of increasing biomedical waste from the COVID-19 pandemic. The PHC innovation fund has also been established to strengthen PHC under the shared care cluster model.

C. Economic Costs and Benefits of Additional Financing

4. The economic analysis was updated following the ADB guidelines on economic analysis.⁵ The cost–benefit analysis of the additional financing estimates quantifiable economic benefits of the project using disability adjusted life-years (DALYs)⁶ averted based on the methodology proposed by the economic analysis of the original project in 2018.⁷ The analysis also considers additional economic benefits from averted COVID-19-related losses, which were not anticipated in the original project.

5. Economic benefits of the proposed additional financing that are quantified by cost–benefit analysis include provision of a fully equipped PHC service and additional support for apex hospitals under output 1, which are expected to avert additional disease, disability, and mortality, which reduces the loss of productivity. Also, provision of a comprehensive health service for COVID-19 patients under output 2 saves productivity because of averted DALYs as a result of COVID-19.

6. The investment is also expected to generate the following benefits which are not specifically quantified because of the paucity of reliable data and projections. Enhancing PHC can reduce the burden at the secondary and tertiary care levels while generating cost savings for government by averting risk factors, diseases, disabilities, and premature deaths. A well-resourced system can also increase the efficient and effective use of resources, resulting in a

⁴ The 10 priority areas are (i) country-level coordination, planning, and monitoring; (ii) risk communication and community engagement; (iii) surveillance, rapid response, and case investigation; (iv) points of entry; (v) national laboratories; (vi) case management; (vii) infection prevention and control; (viii) operations support and logistics; (ix) maintaining essential and emergency health services during an outbreak; and (x) vaccination.

⁵ ADB. 2017. [Guidelines on Economic Analysis of Projects](#). Manila.

⁶ DALYs is the number of years lost because of ill-health, disability, or premature death. DALYs is the sum of years life loss and years living with a disability.

⁷ ADB. 2018. [Report and Recommendation of the President to the Board of Directors: Sri Lanka Health System Enhancement Project](#). Economic Analysis (accessible from the list of linked documents in Appendix 2). Manila.

substantial decline in wasted resources. Emergency COVID-19 response financing not only lessens the burden on the health sector but also improves the Ministry of Health's capacity in terms of preparedness and response to the pandemic. Households are expected to benefit from a reduction in out-of-pocket health expenditure and will redistribute the income savings among other needs and wants (e.g., education, housing, savings and investment, and entertainment). In the long run this investment will increase the quality and quantity of human capital.

7. **Project beneficiaries.** Output 1 of the project has been invested in 135 primary medical care units and divisional hospitals and 127 field health centers, focusing on improving mobility for preventive and curative services across four provinces. Quality of care is also expected to improve with the introduction of the shared cluster care model. The target population is 2,418,718 which is derived from the geographic information system mapping developed for the project, assuming that the total population of the subdistricts will access the nearest primary care unit. Output 2 will support the secondary and tertiary care hospitals across the country, and public hospitals.⁸ The target beneficiaries of output 2 will therefore be the country's population as a whole.

8. **Economic parameters and assumptions.** The economic benefits of output 1 of the additional financing are measured in the productivity gains from averted DALYs, which have been calculated based on selected morbidity causes found in PHC facilities in Sri Lanka.⁹ It is assumed that additional financing will contribute a further 3% reduction in DALYs over the next 20 years (2021–2041).¹⁰ With regards to benefits of output 2, COVID-19-led DALYs averted by the project were measured for the epidemic for 2021–2026. To estimate the contribution of the project, the difference in the estimated number of infectious cases and mortality between two epidemiologic scenarios were calculated: (i) unmitigated (scenario 1) and (ii) suppression at 1.6 per 100,000 deaths trigger (scenario 2).¹¹ The difference between the scenarios was then multiplied with mortality and case rates by age to estimate years life loss and years living with a disability.¹² To be conservative, it was assumed that the project contributes to only 3.0% of total DALYs averted. The DALYs averted because of the project were discounted at 6% which is the ADB hurdle rate for social sectors.

9. **Economic cost and assumptions.** Cost estimates comprise (i) investment costs (civil work for new construction and renovations of health facilities and procurement of medical equipment, vehicles, and information technology equipment); and (ii) operation and maintenance costs, which include running costs of the project capital goods (e.g., civil works, vehicles, medical equipment, and information technology equipment for health information systems) and staff salaries. The economic cost is estimated by applying the domestic price numeraire and adjusting based on the shadow wage rate factor of 0.80 and shadow exchange rate factor of 1.11 (based on 2014–2015 import and export trade data) (footnote 7).

10. **Results.** The cost–benefit analysis of the additional financing project indicates an estimated economic net present value of \$130.2 million and economic internal rate of return

⁸ As per the report and recommendation of the President for the proposed additional financing.

⁹ Morbidity causes include cardiovascular and respiratory disease, diabetes, tuberculosis, and musculoskeletal diseases (World Health Organization. [Health Statistics and Information Systems, Disease Burden and Mortality Estimates](#)). DALYs are assumed to be averted over the 20-year period on a gradual basis and will increase to 70% over time (which is the rate adopted by the original project executing agency).

¹⁰ The economic analysis of the original project assumes a 70% reduction in DALYs. Therefore, the additional contribution is modest.

¹¹ Walker et al. 2020. *Global Impact of COVID-19 and Strategies for Mitigation and Suppression*. London.

¹² Disability weights obtained from the Institute for Health Metrics and Evaluation. COVID-19 disability is assumed to be similar to lower respiratory infection. Duration of disability is assumed to be 1 month.

(EIRR) of 28.9% (Table 1). The cost–benefit analysis of the original project has been updated and the results are given in Table 2. The updated project EIRR is 20.2%, which is higher than the initial project EIRR of 14.4%.

Table 1: Cost–Benefit Analysis of the Additional Financing
(\$, constant 2019 prices)

Year	Additional Benefits	Additional Costs	Net Benefits
2021	10,084,490	13,033,147	(2,948,657)
2022	36,820,944	56,951,876	(20,130,932)
2023	21,047,623	26,932,411	(5,884,788)
2024	11,748,353	9,113,921	2,634,432
2025	13,424,829	9,484,615	3,940,214
2026	15,052,902	1,847,069	13,205,833
2027	16,674,220	5,385,196	11,289,025
2028	18,392,541	2,983,012	15,409,529
2029	20,201,939	1,847,069	18,354,870
2030	22,118,879	1,847,069	20,271,810
2031	24,134,976	1,847,069	22,287,907
2032	26,270,146	36,884,622	(10,614,476)
2033	27,141,985	1,847,069	25,294,916
2034	28,052,496	1,847,069	26,205,427
2035	28,984,768	6,019,921	22,964,848
2036	29,958,311	1,847,069	28,111,242
2037	30,955,300	1,847,069	29,108,231
2038	31,996,340	1,847,069	30,149,271
2039	33,062,642	1,847,069	31,215,573
2040	34,175,966	1,847,069	32,328,897
2041	35,316,511	1,847,069	33,469,442
ENPV			\$130,240,551
EIRR			28.9%

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

Source: Asian Development Bank estimates.

Table 2: Updated Cost–Benefit Analysis

Item	ENPV (\$)	EIRR (%)
Original financing (2018)	42,960,325	14.4
Original financing (2018) + additional financing (2021)	158,873,951	20.2

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

Source: Asian Development Bank estimates.

11. **Sensitivity analysis.** Sensitivity analysis was performed to test the economic viability of the project under unfavorable conditions (Table 3). The base scenario is computed based on the given target population and project cost. Three scenarios were considered: (i) 20% increase in project cost, (ii) 20% decrease in benefits derived, and (iii) 10% decrease in project benefits and 10% increase in project costs. The EIRR was reduced to 16.9% under the first scenario, 16.0% under the second scenario, and 16.5% under the third scenario. All estimates indicate that the project will remain economically viable.

Table 3: Sensitivity Analysis

Item	Base Scenario	Scenario 1: 20% Increase in Project Cost	Scenario 2: 20% Decrease in Project Benefits	Scenario 3: 10% Decrease in Project Benefits and 10% Increase in Project Costs
ENPV (\$)	158,873,951	134,653,594	111,470,869	123,062,231
EIRR (%)	20.2%	16.9%	16.0%	16.5%

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

Source: Asian Development Bank estimates.