UPDATED ECONOMIC ANALYSIS

A. Project Design

1. The Greater Mekong Subregion (GMS) Health Security Project is designed to assist the governments of Cambodia, the Lao People's Democratic Republic (Lao PDR), Myanmar, and Viet Nam to strengthen their health systems for the control of communicable diseases that have a major impact on the region's public health and economy. The original project approved on 22 November 2016 had a total investment of $125 million with three outputs: (i) regional cooperation and communicable disease control in border areas improved; (ii) national disease surveillance and outbreak response systems strengthened; and (iii) laboratory services and hospital infection prevention and control improved. On 22 May 2020, additional financing of $20 million was approved for the Lao PDR[1] followed by further additional financing of $30 million for Myanmar[2] on 8 October 2020. Due to the emerging threat of the coronavirus disease (COVID-19) pandemic, the Government of Cambodia had requested an additional financing of $30 million from Asian Development Bank (ADB) to respond to the COVID-19 by upgrading clinical care, laboratory, infection prevention and control (IPC), and human resource capacity.

B. Macroeconomic Context and Sector Analysis

2. All four countries have experienced high rates of gross domestic product (GDP) growth since 2005, but at the same time, their populations have faced rising prices and increasing income inequality. Government health expenditure (GHE) is relatively low as a percentage of GDP in all four countries. Funding gaps in the health sector, along with large investments in advanced technology and hospitals, have led to high out-of-pocket spending, and insufficient investment for both urban and rural basic health services. In addition, several important development partners have scaled down their engagement, leaving funding gaps in the sector especially for prevention, communicable diseases control, and regional public goods.[3]

C. Project Beneficiaries

3. The four countries had a combined population of 171.2 million people in 2015, with about 28.7 million living below the national poverty line, including about 2.7 million in Cambodia (17.0% poverty rate), 1.5 million in the Lao PDR (22.0% poverty rate), 13.9 million in Myanmar (25.6% poverty rate), and 10.6 million in Viet Nam (11.3% poverty rate).[4] The majority of the poor live in rural and border areas, and belong to ethnic minority groups, where the prevalence of communicable disease is disproportionately high, mortality rates are higher, and the poor have low access to health services in these countries. The original project targets the poorest groups in these areas. In terms of indirect beneficiaries, the project will benefit at least 31.2 million people who live in the nominated 386 project districts within the 67 provinces, states, and regions. The number of expected beneficiaries is 6.39 million in Cambodia, 3.35 million in the Lao PDR, 2.2 million in Myanmar, and 19.29 million in Viet Nam. Of these beneficiaries, approximately 11.3 million live in border areas. Under the additional financing for Cambodia, the project will support nation-wide COVID-19 response and is expected to expand the original project component to 12 additional provinces with 8.99 million population in size.

---

[1] ADB Lao PDR: Greater Mekong Subregion Health Security Project (Additional Financing)
[2] ADB Myanmar: Greater Mekong Subregion Health Security Project (Additional Financing)
[3] Paragraphs 2 to 7 of the Economic Analysis are drawn from those of original project and additional financings as noted in footnote 1 and 2.
[4] World Bank. *Poverty and Equity Regional Dashboards 2016.* http://povertydata.worldbank.org/poverty/home/ (accessed 15 June 2016).

D. Rationale for Public Sector Involvement

4. The project addresses (i) market failures in terms of regional public goods, externalities, and gaps in services for the poor; and (ii) missing information and information asymmetry that can inhibit regional response to outbreaks. Demand for communicable disease control is likely to be lower than desired, making it less attractive for the private sector unless publicly subsidized.[5]

5. There are strong linkages between health and the burden of infectious diseases and labor productivity. Poor educational achievement by sick school-age children results in lower human capital formation.[6] Socioeconomic impacts include productivity losses and costs to the public health system. For example, by 2025, if Indonesia fails to halt and reverse the HIV/AIDS epidemic, this will increase annual hospital workload by 2.1% and lead to 4 million extra outpatient visits. Indirect benefits of preventing transmission of diseases include avoiding disruption of economic activity, especially trade and tourism; reducing public anxiety; and maintaining business confidence. The severe acute respiratory syndrome outbreak in 2003 and the avian influenza outbreak in 2004 highlighted the vulnerability of national economies to epidemics. The culling of domestic fowl during outbreaks reduced family incomes in the GMS. In Viet Nam, the value of birds culled represented 0.3% of GDP, and in Thailand, 0.16% of GDP.[7]

6. The four governments are major providers of preventive and promotive health care in rural areas. Despite high economic internal rate of return (EIRR) for many investments in the health sector, private participation is suboptimal. The gaps in quality rural health services justify continued government intervention. There are few regulatory barriers that prevent more qualified providers from entering the rural market, but there is limited interest in offering preventive and promotive services. Contracting out also requires considerable administrative and monitoring capacity. Global financing to fight communicable diseases is not always aligned with the disease priorities of developing countries, and since donors tend to imitate each other's funding decisions, the real needs of developing countries may be overlooked.[8] Applying the concept of global public good to health funding decisions reprioritizes financing for communicable diseases.

7. The project will support the implementation of strategies, diagnostic and treatment standards, and public education.[9] Development partner financing will supplement government funding and thus allow governments to finance programs that had been lacking funds. Beyond the health sector, there can be a fungibility problem of balancing allocations among sectors within the overall public resource envelope. The project will increase sector allocations for preventive services, which are associated with greater health impact. In addition, the project targets remote border districts where the economic returns on investment are likely to be much higher despite higher unit costs for service delivery.

---

5 J. Knowles. 2003. Health Nutrition and Infectious Disease and Economic Growth in Cambodia. Unpublished.

6 J. Sachs et al. 2001. *Macroeconomics and Health: Investing in Health for Economic Development. Report of the Commission on Macroeconomics and Health*. Geneva: World Health Organization.

7 D. U. Pfeiffer et al. 2013. A One Health Perspective on HPAI H5N1 in the Greater Mekong Sub-region. *Comparative Immunology, Microbiology and Infectious Diseases*. 36 (3). pp. 309–319. For Thailand, the value of culled birds equates $276 million, while GDP in 2004 was $173 billion.

8 I. Gupta and P. Guin. 2010. Communicable Diseases in the South-East Asia Region of the World Health Organization: Towards a More Effective Response. *Bulletin of the World Health Organization*. 88 (3). pp. 199–205.

9 Monitoring and appropriate incentives are needed to help project inputs achieve their intended results. All four countries face chronic funding, staff, and operational problems, especially for services in rural areas. As far as financially possible, the four countries are making long-term adjustments in the form of pay rises and incentives for postings all health professionals to rural areas to offset social, transport, and opportunity costs.

E. Additional Financing

8. The proposed additional financing will support the MOH in responding to COVID-19. The project will support laboratory services and IPC in 8 provincial hospitals and 73 district referral hospitals across 11 additional provinces and Phnom Penh municipality. This extends the original program's benefits to an additional 8.99 million people. Fourteen provincial hospitals will be equipped to provide emergency clinical care for COVID-19 patients, including upgraded oxygen supply. Surveillance and response capacity for COVID-19 and other communicable diseases will be strengthened nation-wide. The additional financing will complement ADB's support under the COVID-19 Active Response and Expenditure Support Program and the Cambodia Rapid Immunization Support Project.[10] The additional financing project remains aligned with the outcome of the original project: GMS health system performance with regard to health security improved.

F. Economic Costs and Benefits of Additional Financing

9. The economic analysis was updated following 2017 ADB guidelines on economic analysis.[11] The **cost-effectiveness analysis** of the additional financing in Cambodia estimates economic benefits that arise from two major streams; (i) the project benefits of strengthening MOH physical infrastructure and human resource capacity to contain and provide treatment for COVID-19 cases (ii) the benefits from expanding project's intervention that strengthen disease surveillance and outbreak response systems, laboratory services and hospital IPC to all 24 provinces and one municipality in Cambodia. The assessment considers the project benefit in terms of its averted Disability Adjusted-Life Years (DALYs)[12] for both streams.

10. To measure the benefit from the first COVID-19 containment and care stream, the assessment considers the project benefit in terms of its averted DALYs from COVID-19 for the epidemic period 2021-2026. To estimate the contribution of the project, the difference in the estimated number of infectious cases and mortality between two epidemiologic scenarios: (i) unmitigated (scenario 1) and (ii) suppression at 1.6 per 100,000 deaths trigger (scenario 2).[13] The difference between the scenarios was then multiplied with mortality and case rates by age to estimate years of life lost (YLL) and years lived with disability (YLD).[14] The DALYs averted due to the project was discounted at 3%, following the WHO guideline on DALY discounting[15] and 6% which is the ADB hurdle rate for social sectors. To be on the conservative side, it was assumed that the project contributes to only 5.0% of total DALY averted.[16]

11. Additional financing will also extend the coverage of project target in Cambodia from 12 to all 25 provinces/municipalities with additional project beneficiary of 8.99 million population in size. It is assumed, based on the original financing economic analysis, that the project will result in fewer incidences of selected communicable diseases through strengthened communicable disease control and IPC. The benefits are measured by assuming the annual reduction of 10% in

---

[10] ADB. 2020. COVID-19 Active Response and Expenditure Support Program; and ADB. 2021. Forthcoming. Cambodia Rapid Immunization Support Project. Manila.

[11] ADB. 2017. Guidelines on Economic Analysis of Projects. Manila: Asian Development Bank.

[12] DALY is the number of years lost due to ill-health, disability, or premature death. DALY is the sum of years of life lost (YLL) and years lived with disability (YLD).

[13] Walker, et al., 2020. *Global Impact of COVID-19 and Strategies for Mitigation and Suppression*.

[14] 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 one month.

[15] Guidelines from WHO and the DCP2 Project discounts DALYs at 3%. This study doubles the discount rate to be on the conservative side.

[16] This assumption follows that of Lao PDR and Myanmar additional financing.

related DALYs through the improvement in identification of tuberculosis, hygiene, sanitation, deworming education, vector control for dengue, and HIV screening).[17] As with the original financing model, the benefit is assumed to last for 10 years from the start of project implementation in 2021.[18]

12. **Economic costs.** The total capital investment costs (excluding price contingencies and taxes) are spread over the 3 years of implementation, according to the projected disbursement schedule. The rest of the project costs are recurrent operating costs, and equipment/vehicle maintenance and replacement every 5 years depending on the nature of items. Economic investment costs are estimated using the domestic price numeraire method by applying a shadow exchange rate factor of 1.02 on traded costs and a standard conversion factor of 1 for non-traded and scarce labor, and shadow wage rate 0.9.[19] The economic cost of the project was discounted at 3% and 6% per ADB guidelines.

13. **The cost-effective analysis** shows show that the discounted cost per disability-adjusted life year as shown in incremental cost effectiveness ratio is substantially less than the gross domestic product per capita, making the intervention very cost-effective (Table 1).[20]

Table 1: Cost-Effectiveness Analysis

Year	Project Costs	DALYS Averted
2021	211,886	69
2022	13,609,591	12,192
2023	15,205,709	12,819
2024	2,027,508	7,990
2025	2,027,508	8,099
2026	15,646,874	8,209
2027	2,027,508	8,321
2028	2,027,508	8,434
2029	2,027,508	8,549
2030	15,646,874	8,665
PV at 3%	60,049,550	70,674
PV at 6%	51,788,566	60,572
ICER at 3%		850
ICER at 6%		855
GDP per capita (2021, US$, at current prices)		1,772
Three times GDP per capita		5,316

DALYs=disability-adjusted life years, GDP=gross domestic product, ICER=incremental cost effectiveness ratio, PV=present value.
Source: Asian Development Bank estimates.

G. Sensitivity Analysis

14. To confirm the project's economic viability and assess how it will be affected by changes in key variables, a sensitivity analysis was conducted by (i) varying project costs (10% higher), (ii) varying project benefits (10% lower), and (iii) combining (i) and (ii). Various sensitivity analyses

[17] See ADB 2016 Greater Mekong Subregion Health Security Project Linked Document No. 9 for more detail on the economic analysis model assumptions and methodologies.

[18] In addition to the gain form averted DALYs, the original financing economic analysis also takes into account of the monetary benefit of the project such as the averted economic cost of epidemics and hospital infection under its cost benefit analysis. Our cost-effectiveness analysis relies on DALYs and does not monetize those values.

[19] Rates are derived from EREA, unpublished mimeo, and ADB. 2017. Guidelines for the Economic Analysis of Projects. Manila.

[20] WHO Commission on Macroeconomics and Health & World Health Organization. 2001. Macroeconomics and health: investing in health for economic development: executive summary / report of the Commission on Macroeconomics and Health.

scenarios show that the project is very cost effective, regardless of discount rate, decrease in benefits, and increase in benefits (Table 2).

Table 2: Sensitivity Analysis on Incremental Cost Effectiveness Ratio

	Discount rate at 3%	Discount rate at 6%
10% increase in cost	935	940
10% decrease in benefits	944	950
10% increase in cost and 10% decrease in benefits	1,038	1,045

Source: Asian Development Bank estimates.

H. Updating Economic and Financial Assessment of GMS Health Security Project

15. Following ADB's Staff Instruction on Business Processes for Additional Financing, the cost-benefit analysis conducted in the original project (regional) was also updated (Table 3).[21] An EIRR of 31.8.% was estimated for this project, higher than the original calculated value of 28.1% and above the minimum required threshold of 6% for social sector investments. The full economic benefits of the project are expected to be significantly higher as the analysis excludes some benefits such as the productivity losses among infected individuals during treatment, and quality of life improvements among patients and their families. Reductions in COVID-19 infections and deaths also improve the protection of patients and their families from catastrophic health expenditures and the risk impoverishment from medical expenses associated with treatment. Data constraints limit the estimation of full project benefits.

Table 3: Economic Internal Rate of Return of GMS Health Security Project
($ million, 2017 constant prices)

Year	Original Financing*			Additional Financing		Updated (with Additional Financing)		
	Economic Costs	Economic Benefits	Net Benefits	Additional Costs	Additional Benefits	Economic Costs	Economic Benefits	Net Benefits
2017	19.2	-	(19.2)	-	-	19.2	-	(19.2)
2018	48.5	23.7	(24.8)	-	-	48.5	23.7	(24.8)
2019	41.6	25.0	(16.6)	-	-	41.6	25.0	(16.6)
2020	39.8	62.5	22.7	-	-	39.8	62.5	22.7
2021	39.9	66.2	26.3	0.2	0.1	40.1	66.3	26.2
2022	3.4	30.9	27.5	12.0	16.5	15.5	47.4	31.9
2023	2.4	31.6	29.3	13.5	17.7	15.8	49.3	33.5
2024	2.4	33.0	30.6	1.8	10.4	4.2	43.4	39.2
2025	2.4	34.9	32.6	1.8	10.9	4.2	45.8	41.7
2026	2.4	37.0	34.6	13.8	11.4	16.2	48.4	32.2
2027	-	-	-	1.6	11.9	1.6	11.9	10.3
2028	-	-	-	1.6	12.5	1.6	12.5	10.8
2029	-	-	-	1.6	13.1	1.6	13.1	11.4
2030	-	-	-	10.4	13.7	10.4	13.7	3.3
		ENPV	43.0				ENPV	62.1
		EIRR	28.1%				EIRR	31.8%

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

* Original Financing includes the Additional Financing for Lao People's Democratic Republic approved in 2020.

** Additional benefits are estimated conservatively as 5% of DALYs averted from the COVID-19-related infections and deaths prevented through the additional project financing.

Source: Asian Development Bank estimates.

[21] Although the minimum required threshold for ADB social sector projects is 6%–9%, this analysis uses a 12% discount rate.