



Decision time: Cost estimations and policy implications to advance Universal Health Coverage in Cambodia[☆]

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Abstract

Cambodia aims to expand social health protection to move toward Universal Health Coverage. We developed a modeling tool to facilitate the simple, interactive estimation of cost and coverage for three policy alternatives, enabling decision-makers to simultaneously adjust for scenario options currently under consideration. Assuming the adoption of all scenario options, the projected cost of expanding social health protection to all is US\$42 million, to vulnerable individuals is US\$32.1 million, and to uncovered 1st–3rd wealth quintile people is US\$30.4 million. These policy alternatives are projected to increase population coverage to 100%, 89.1%, and 92.5% by 2025, respectively. The results have multiple policy implications. First, given the similar costs and coverage estimates for the targeted approaches, and other considerations, expansion to the 1st–3rd wealth quintiles is recommended. Second, the model quantifies the potential impacts for policy changes relating to each scenario option. The inclusion of dependents under the contributory schemes significantly shifts costs; reversing the policy of non-payment for priority public health services increases public health facility revenue; and, alignment of reimbursement rates leverages demand-side financing which can

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increase value for money. Finally, the cost estimates provide a basis for economic planning. Revenue raising options include increasing the contribution ceiling for the private employees' scheme and the progressive adoption of strategic purchasing.

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1. Introduction

1.1. Background

Social health protection and Universal Health Coverage (UHC) are high on the international agenda. The Sustainable Development Goals (SDGs) call for the implementation of “nationally appropriate social protection systems. . . and by 2030 achieve substantial coverage of the poor and the vulnerable”. The SDGs also call for attainment of “universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all” (United Nations, 2019).

Cambodia's National Social Protection Policy (NSPP) Framework 2016–2025 aims to develop and expand social health protection schemes to achieve UHC with a focus on the poor and vulnerable (Council of Ministers, 2017). This ambitious policy objective is reconfirmed in Cambodia's highest level strategy document, the Rectangular Strategy Phase IV (2018–2023), which states that the government will “focus on pushing for universal health coverage in Cambodia by expanding the coverage of [the] health equity fund. . .” (Royal Government of Cambodia, 2018). The Health Equity Fund (HEF), Cambodia's largest social health protection scheme, covering about 2.6 million individuals, is designed to facilitate free access to health care for the poorest (Annear, Khim, Moscoe, Jordanwood, & Bossert, 2016; White Kaba et al., 2018). HEF reimburses public health facility user fees normally paid out-of-pocket by the patient. Under particular circumstances, the scheme also pays non-medical expenses (i.e. food, transportation, and a funeral grant). Total payments from this scheme surpassed US\$21.3 million in 2019.

The National Social Security Fund (NSSF), under the Ministry of Labour and Vocational Training, manages the civil servants' (NSSF-C) and formally employed workers' (NSSF-F) health insurance schemes. These schemes currently cover approximately 356,000 and 1.7 million people, respectively; and, do not include dependents. Coverage under these schemes provides user fee reimbursements to all contracted public healthcare providers as well as some private facilities. NSSF reimbursement are on average (weighted by facility level) 119% higher compared with HEF rates.

The Cambodian Ministry of Health aims to increase enrolment in a social health protection scheme to 50% of the population by 2020 (Ministry of Health, 2016). However, recent estimates reveal that although about 46% of the population has a potential coverage mechanism (i.e. legal coverage), and only about 30% are enrolled (i.e. effective coverage). Vulnerable individuals with no health coverage mechanism comprise over 31% of the total population or nearly 5 million people (Kolesar et al., 2020).

As noted above, the HEF aims to mitigate out-of-pocket expenditure (OOPE) which can be a barrier to access and lead to financial hardship due to distress financing (i.e. borrowing with interest) (Bigdeli & Annear, 2009; Ir et al., 2019). In Cambodia, OOPE is estimated to constitute approximately 60% of total health expenditure, implying a high risk for healthcare-related financial hardship (World Health Organization, 2018). OOPE should be reduced to about 30% of total health expenditure to progress toward UHC (Fernandes Antunes et al., 2018; World Health Organization, 2015).

Vulnerability is the forward-looking potential of harm from risk exposure and the (in)ability to manage risks and shocks (Alwang, Siegel, & Jørgensen, 2001; Food and Agriculture Organization, 2010). Several groups are susceptible to financial shocks due to a combination of (low) income status and (high) need for healthcare. These groups include lower-income wealth quintiles (Kolesar et al., 2020), children under five years of age (Jacobs, de Groot, & Fernandez Antunes, 2016), pregnant women (Ir et al., 2015), disabled people (Palmer, Williams, & McPake, 2018), older people (Jacobs et al., 2016), People Living with HIV (PLHIV) (United Nations, 2019), and tuberculosis (TB) patients (Morishita, Yadav, Saint, & Nishikiori, 2016). Without health insurance, vulnerability increases as out-of-pocket costs and the opportunity costs of health care-seeking can undermine the individual's financial position and destabilize the household's ability to cope with stressors and shocks.

The pursuit of UHC will inevitably require governments to find additional budgetary resources and therefore to increase the fiscal space for health (Yip & Hafez, 2015). The World Health Organization has identified the need for increased public spending for health and improved health system efficiency as priority areas for Cambodia (World Health Organization, 2017). Cambodia has experienced strong (7.7%) economic growth over the past two decades (1995–2017) (World Bank, 2018). The country's health budget, which is linked tightly to the predicted 7% economic growth per annum, has been increasing in absolute terms but not in real terms (Thin & Sokbunthoeun, 2017). The rapidly growing economy and robust tax collection have contributed to increased revenue. Over the past five years, tax collection revenues have increased an average of 20% annually (Post Staff, 2019). A recent fiscal space analysis revealed that Cambodia registered a 2018 budget surplus equivalent to about US\$150 million, confirming that the country can opt for redistributive policies without compromising its economic growth prospects (Levy, 2019). Affordable access to health (and education) are necessary to ensure the benefits of growth are spread to the greatest degree possible (Campano & Salvatore, 2007).

1.2. Model, policy alternatives, and scenario options

Modeling tools can help to inform decision-making for health care policy options and reform. However, for models to be useful the results must be effectively communicated to policy makers (Ringel, Eibner, Girosi, Cordova, & McGlynn, 2010). We developed a modeling tool to facilitate the simple, interactive estimation of costs and coverage related to HEF expansion. This paper presents three policy alternatives: (1) HEF for All; (2) HEF for all vulnerable groups; and, (3) HEF for the uncovered 1st–3rd wealth quintiles (1st being poorest). Under the second policy alternative, the tool enables policy makers to independently vary HEF coverage expansion by nine vulnerable groups and start year.

The tool also enables the inclusion of administrative costs related to claims monitoring and certification as well as projected reimbursement costs for current HEF beneficiaries. In addition, within a scenario, the tool incorporates simultaneous modeling of four scenario options which can be independently varied (see Table 1).

Table 1
User controlled modeling options.

Policy alternatives	Cost inclusions	Start years	Scenario options			
			Dependent inclusion by NSSF		Payment for exempted services (3)	Reimbursement rates applied (4)
			Private employees (1)	Civil servants (2)		
(1) HEF for All	Claims monitoring	2020	Yes	Yes	Yes	HEF
		2021	No	No	No	NSSF
	Current beneficiaries	2022				70% of full cost
		2023				
		2024				
		2025				

(2) Uncovered people of the 1st–3rdQ

(3) Vulnerable Groups:

- 1stQ uncovered
- 2ndQ self-employed
- 3rdQ self-employed
- Children < 5 yrs
- Pregnant women
- Disabled
- Elderly 60+
- PLHIV
- TB patients

Note: Q = quintile.

The first and second scenario options relate to the inclusion of dependents under the National Social Security Fund formal sector scheme for private sector employees (NSSF-F) and the civil servants' scheme (NSSF-C), respectively. Dependent coverage under these schemes will reduce the overall pool of uncovered individuals, thus reducing the costs associated with HEF expansion to the remaining uncovered groups. Policy makers can independently select to include dependents (yes) or exclude dependents (no) for each scheme.

The third scenario option relates to the NSSF rule to not reimburse services that are provided free of charge to their members at public facilities (Ministry of Labour and Vocational Training, 2016a). These include immunization, HIV/AIDS, tuberculosis, malaria services (World Health Organization, 2017). These services are provided free of charge to the patient to remove access barriers for priority public health services to control the spread of disease among the population. However, non-reimbursement creates a financial disincentive to providers to render these services to NSSF members, especially as HEF reimburses for these services. Policy makers can select to continue this rule (yes) or end it (no).

The fourth scenario option relates to the reimbursement rates paid to public health facilities in exchange for services provided. Policy makers can select one of three rate options: (1) current HEF rates, (2) NSSF rates, and (3) 70% of full costs. Aligning (the lower) HEF rates to match NSSF rates would correct the current two-tier system which provides a financial disincentive for providers to render services to patients under the HEF scheme.

2. Methodology

Building on two prior modeling studies undertaken by Axelson and Jacobs (2016) and Axelson, Hennicot, and Jacobs (2015), we developed a computational cell-based model using Microsoft Excel (2016) and Tableau Public (Tableau Public Software, 2019) to estimate costs and coverage outcomes of expanding HEF. Cost estimates are calculated following Eq. (1):

$$[\text{Effective coverage (\%)} * \text{Population size (individuals)} * \text{Utilization rate (mean annual visits per individual)} * \text{Unit cost (US\$per case)}] \quad (1)$$

Coverage estimates are calculated by multiplying cumulative enrolment coverage (%) by population group size estimates (individuals). Data needed to parameterize the model were compiled from multiple sources and adjusted as detailed below.

2.1. Effective coverage and population size

Effective coverage (i.e. people enrolled) is assumed to cumulatively increase at a rate of 20% beginning in the start year selected for each selected population group. Population group sizes were estimated using the Cambodia Socio-economic Survey (CSES) 2016 data, Demographic and Health Survey statistics, and National Institute of Statistics 2019 population projections (Kolesar et al., 2020; National Institute of Statistics, 2015, 2016, 2017). Population size is calculated to increase by 1.49% per year for all groups exempting PLHIV and TB patients (World Bank, 2019). PLHIV on treatment are expected to increase at the average net rate (2.3%) rate from 2013 to 2018 onwards (UNAIDS, 2019). The TB patient population is expected to remain stable as prevalence is decreasing while case detection is increasing (Yale, 2015). Dependency ratios, based on dependent spouses and children under 18 years of age, for the private employees' and civil servants' schemes is 1.01 and 1.21 respectively (Hennicot, 2015; International Labor

[Organization, 2016](#)). These rates were adjusted to align with NSSF's definition of dependents under its employment injury scheme to include parents and older adults (i.e. all non-active adults), yielding dependency ratios of 1.27 and 1.47, respectively. The dependency ratios are low compared to the mean household size (4.3) because they account for households with more than one worker. In addition, the lower ratio for private employees is attributable to the fact that the garment workers, predominately single women, number nearly 800,000-accounting for nearly one-quarter (24.2%) of the entire formally employed sector ([Associated Press, 2019](#)). Population coverage estimates are non-duplicative. The expansion of coverage to dependents under the private employees' and civil servants' schemes (scenario options 1 and 2) is adjusted using the proportion of employment category by wealth quintile calculated from the 2016 CSES. Finally, when scenario options to expand existing scheme coverage to dependents are selected, the projected number of newly covered individuals is calculated and subtracted from the remaining uncovered population groups, proportional to each group's size in the general population.

2.2. Utilization rates

Utilization rates were calculated from Ministry of Health achievement reports (2014–2019) ([Ministry of Health, 2019](#)). The most recent year (2017) data was used to calculate separate HEF outpatient (OPD) and inpatient (IPD) utilization rates. These rates were then adjusted for the average year-on-year increase over the past three years, yielding (2019) base-year rates of 1.38 and 0.71 for OPD and IPD, respectively. To estimate group specific rates, the base-year rates were weighted by the proportion of health service usage for children under five, children 5–14 years of age, and elderly 60+ using 2016–2018 service statistics data reported in the Patient Management and Registration System ([Ministry of Health, 2019](#)). As adults aged 15–59 were not identified in the data, the base-rate was used; the weighting for elderly 60+ was also applied for disabled people. These rates were all projected to increase at a rate of 2% per year starting from the base-year, exempting a 5% per year increase among the uncovered first wealth quintile. For PLHIV services, average use of 5.7 per patient per year was applied for outpatient services; inpatient rates were 4% and 4.1% for PLHIV and TB patients, respectively ([Johns & Kouland, 2017](#)). For pregnant women and (outpatient) TB patients, national guidelines were used to estimate (optimal) utilization.

2.3. Unit costs

Reimbursement rates were calculated using the service-based payment schedules for the HEF and National Social Security Fund ([Ministry of Economy and Finance, 2018](#); [Ministry of Labour and Vocational Training, 2016b](#)). These are nominal rates primarily intended to supplement health facility staff salaries. Full cost estimates were calculated from a recently completed costing study ([Jacobs, 2019](#)). Unit costs include medical and non-medical costs. Medical unit costs were calculated using a top down approach by service type (i.e. in-patient and out-patient) from 2017 data ([Ministry of Health, 2019](#)). These unit costs were then adjusted to reflect reimbursement rate revisions adopted in 2018. NSSF and full cost unit reimbursement rates were calculated by taking the mean difference between rates by service type for each facility level (i.e. health center and four hospital levels). The mean differences were applied to the HEF base rates for each service type. In addition, non-medical costs related to payments for patient food, transport, and funeral allowance were calculated using actual reimbursements (2017 data) divided by total beneficia-

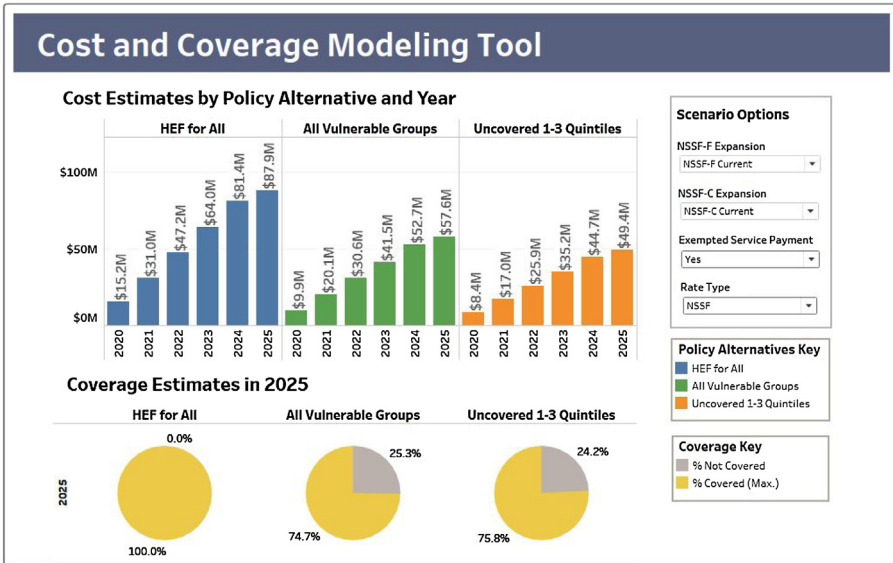


Fig. 1. Cost and coverage modeling tool dashboard: three policy alternatives using NSSF rates without the adoption of scenario options 1–3.

ries. This amount was not adjusted as the rates were stable over the past three years. Medical and non-medical unit costs were added and multiplied by the total population estimate for each group.

3. Results

Figs. 1 and 2, screenshots of the modeling tool, illustrate how it can be used for policy testing by adjusting the four scenario options and comparing the cost and coverage outcomes across the three policy alternatives. Fig. 1 compares the year-to-year cost estimates for the three policy alternatives as well as the total estimated population coverage under each alternative and assuming the status quo for scenario options 1–3 with NSSF rates (option 4). Policy alternative 1, expansion of HEF coverage to all uncovered people, is estimated to cost US\$87.9 million once full enrollment is reached in 2025 (see Fig. 1). The costs reduce to US\$66.4 million when applying HEF rates (see Table 2). Policy alternative 2, extending coverage to all vulnerable groups, is expected to cost US\$57.6 million and would achieve up to 74.7% population coverage by 2025 (see Fig. 1). Applying the HEF rates reduces costs to US\$40.1 million (see Table 2). Finally, policy alternative 3, expanding HEF to the uncovered 1–3 wealth quintiles, is projected to cost US\$49.4 million, and increasing total population coverage up to 75.8% (see Fig. 1). The costs amount to US\$37.3 million when applying HEF rates (see Table 2).

The higher cost among the vulnerable populations is primarily attributable to higher health service utilization rates among children under 5 years of age, pregnant women, and (to a lesser extent) the elderly. Policy alternative 2 accounts for 100% of these populations, whereas policy alternative 2 excludes the two top wealth quintiles (i.e. 40% of these populations). Table 2 presents summary results of the estimated population coverage needs and costs (in US\$) for each policy alternative and scenario option.

Table 2
Estimated population coverage needs and costs in 2025 by policy alternative and scenario option.

Policy alternatives	Scenario options			Population needing coverage in 2025	Total Cost Estimate in 2025 in US\$	
	Dependent inclusion (both schemes)	Payment for exempt services	Reimbursement rate			
(1) HEF for All	No	No	HEF	9,995,359	65,637,106	
	Yes	No	HEF	4,831,161	31,725,066	
	No	Yes	HEF	9,995,359	66,387,818	
	Yes	Yes	HEF	4,831,161	42,363,825	
	No	No	NSSF	9,995,359	86,938,130	
	Yes	No	NSSF	4,831,161	42,020,712	
	No	Yes	NSSF	9,995,359	87,894,476	
	Yes	Yes	NSSF	4,831,161	56,593,006	
	No	No	70% Full costs	9,995,359	122,178,991	
	Yes	No	70% Full costs	4,831,161	59,054,045	
	No	Yes	70% Full costs	9,995,359	125,124,657	
	Yes	Yes	70% Full costs	4,831,161	81,397,051	
	(2) Vulnerable groups	No	No	HEF	5,505,048	41,588,610
		Yes	No	HEF	2,884,903	22,929,023
No		Yes	HEF	5,485,085	40,838,020	
Yes		Yes	HEF	3,574,792	31,346,679	
No		No	NSSF	5,505,048	58,532,200	
Yes		No	NSSF	2,884,903	32,067,898	
No		Yes	NSSF	5,485,085	57,571,363	
Yes		Yes	NSSF	3,574,792	43,380,572	
No		No	70% Full costs	5,505,048	87,527,774	
Yes		No	70% Full costs	2,884,903	49,294,260	
No		Yes	70% Full costs	5,485,085	85,378,808	
Yes		Yes	70% Full costs	3,574,792	64,097,062	

Table 2 (Continued)

Policy alternatives	Scenario options			Population needing coverage in 2025	Total Cost Estimate in 2025 in US\$
	Dependent inclusion (both schemes)	Payment for exempt services	Reimbursement rate		
(3) Uncovered people of the 1st–3rd quintiles	No	No	HEF	5,537,203	36,847,054
	Yes	No	HEF	3,498,509	22,973,863
	No	Yes	HEF	5,679,243	37,294,217
	Yes	Yes	HEF	3,498,509	27,401,961
	No	No	NSSF	5,537,203	48,765,536
	Yes	No	NSSF	3,498,509	30,429,506
	No	Yes	NSSF	5,679,243	49,397,203
	Yes	Yes	NSSF	3,498,509	36,561,635
	No	No	70% Full costs	5,537,203	69,009,749
	Yes	No	70% Full costs	3,498,509	42,764,278
	No	Yes	70% Full costs	5,679,243	69,420,638
	Yes	Yes	70% Full costs	3,498,509	52,082,439

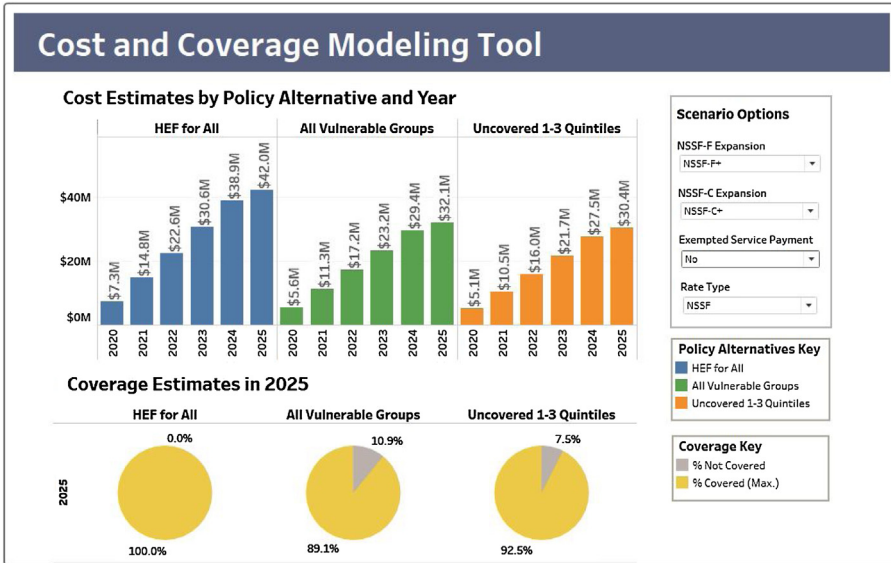


Fig. 2. Cost and coverage modeling tool dashboard: three policy alternatives using NSSF rates with the adoption of scenario options 1–3.

The modeling tool enables policy-based testing for each of the three policy alternatives by comparing the projected cost and coverage outcomes resultant from adjusting the four scenario options. For example, the cost estimates decrease considerably if scenario options 1–3 are implemented: dependents are covered under both the NSSF schemes (i.e. private employees’ and civil servants’), and the NSSF rule not to reimburse priority public health services is rescinded (see Fig. 2). Applying the NSSF rates, the expected 2025 cost of extending HEF for all is US\$42.0 million; all vulnerable groups is US\$32.1 million with population coverage up to 89.1%; and uncovered 1–3 wealth quintiles is US\$30.4 million with population coverage up to 92.5%. Applying the HEF rates, these policy alternatives are projected to cost US\$31.7 million, \$22.9 million, and US\$23.0 million, respectively (see Table 2).

Comparing the adoption of scenario options 1–3 under policy alternatives 2 and 3 shows both cost projections to be similar: US\$32.1 million and US\$30.4 million, respectively. The greater reduction in costs related to policy alternative 3 can be attributed to the fact that formal employees and civil servants comprise a higher proportion of working age adults among the 4th and 5th wealth quintiles (29.4% and 27.3%) compared to the three lowest quintiles (13.7% and 15.1%). Thus, the impact of NSSF expanding coverage to dependents disproportionately benefits the higher wealth quintiles.

Fig. 3, a screenshot of the cost modeling for vulnerable groups dashboard, shows the yearly costs cumulatively and by individual vulnerable groups with the adoption of the three scenario options using NSSF rates. The largest share of the projected 2025 costs (43.3%) are attributable to children under five years of age who comprise the largest population group among the nine vulnerable groups.

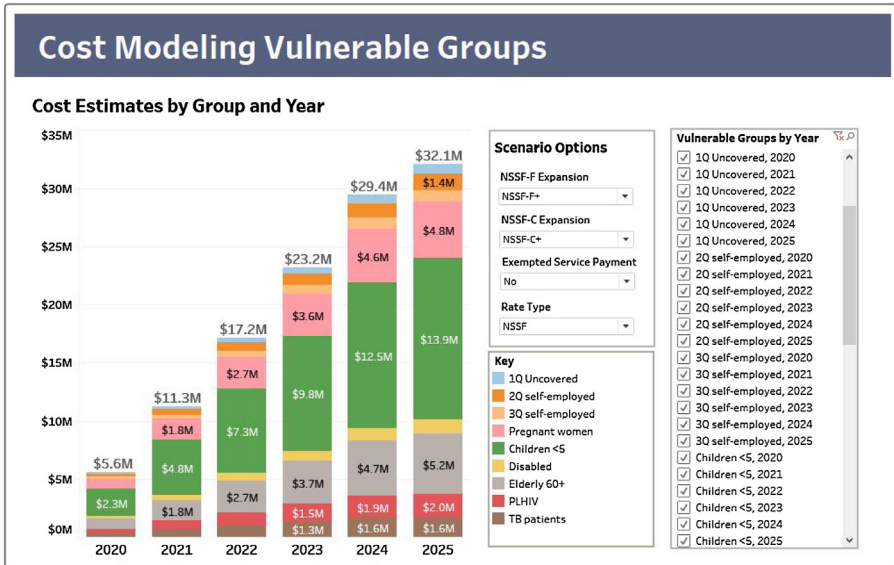


Fig. 3. Cost modeling vulnerable groups dashboard: Cumulative Total Costs by Year and Vulnerable groups for all groups using NSSF rates with the adoption of scenario options 1–3.

4. Discussion

4.1. Limitations

First, the model does not specifically project supply-side costs to the public health system. However, NSSF expansion to dependents and HEF coverage expansion is expected to increase utilization of public health services. User-fee reimbursements are used for staff incentive payments (60%) and quality improvement (~40%) which can include local procurement. Thus, this revenue does not necessarily cover the expected increased costs related to personnel, medications, and commodities. Scenario option 4 enables the adjustment of cost estimates using three reimbursement rate options including 70% of full costs. This rate option was included in the model to enable the illustration of the potential budget amount that could be shifted to demand-side financing (i.e. payment linked to service provision) which could help to mitigate expected cost increases at the health facility level as well as optimize purchasing power using a strategic purchasing approach (see Section 4.2.2).

The difference between the current reimbursement rates and 70% of full cost estimates can approximate the additional supply-side costs assuming no change in health system technical efficiency, including potential economies of scale from increased utilization. However, there is evidence suggesting that health system efficiency can be improved. The 2010 World Health Report estimates conservatively that 20–40% of all resources spent on health are wasted and asserts that all countries can achieve more with the same resources (World Health Organization, 2010). A study assessing overall health system technical efficiency in Asia found Cambodia to be among the countries that can improve use of the current level of resources (Ahmed et al., 2019). There is low utilization of public sector services with less than one-fifth of patients seeking first care at public facilities (Kolesar, Pheakdey, Jacobs, & Ross, 2019). Within that context, an analysis

of health district productivity for public sector services in five provinces found great variation in efficiency scores and trends of scores, providing evidence of sub-optimal performance. The same study found that areas with HEF to be associated with higher efficiency (Ensor, So, & Witter, 2016). Another study found that public health center technical efficiency could be improved by increasing health service utilization and quality (Beiter, 2018). In addition, a recent healthcare costing study found a high degree of variation of total and unit costs within each facility level (i.e. health centers, national, provincial, district, and referral hospitals). As public health facilities have high fixed costs, an increasing workload leads to a decrease of unit costs, suggesting room to improve efficiency by increasing workload (Jacobs et al., 2019).

In addition, we do not estimate the costs associated with identification and enrollment of new HEF beneficiaries. Cambodia currently has a national rolling system to identify HEF eligibility which reassesses about one-third of the population every year. Costs related to amending the inclusion criteria and data management are likely minimal.

Finally, there were limitations with some parameters used in the model. We faced some challenges retaining internal consistency given data constraints. For example, service statistics provided by the MOH do not enable the identification of utilization for disabled people, adults, pregnant women, PLHIV, nor TB patients. This required using different second and tertiary approaches to parameterize the model. In the case of disabled people, we assumed rates to be similar to elderly 60+, in the case of adults we adopted the average utilization rates, and for other populations we reverted to service provision guidelines relating to recommended outpatient visit frequency. Inpatient service utilization is dependent on case-specific illness severity or clinical determination. For pregnant women, we estimated these rates by assuming only one inpatient for pregnant women for childbirth. For TB and PLHIV, we used a Cambodia specific study. These limitations are far outweighed by the utility of the model. Weinstein et al. contend that “decisions made with a model using limited data are likely better than decision made with limited data and no model” (Weinstein et al., 2003).

4.2. Interpretation

The results have multiple policy applications. First, the comparison of cost and coverage estimates provides three alternatives to inform decision-making among policymakers as to the best option to advance the RGC’s high-level goals to expand population coverage under social health protection. Second, the tool enables the (user-controlled) simultaneous estimation of the cost and coverage impact for four scenario options to compare the status quo with policy changes to advance the achievement of UHC. Third, the cost estimates provide a predicate for economic planning related to coverage expansion. This extends the policy dialog to include strategic purchasing and revenue raising. Each policy application is elaborated below.

4.2.1. Policy alternatives

HEF can be expanded to all people not covered by any other scheme (i.e. non-targeted) or targeted to vulnerable individuals or uncovered 1st–3rd wealth quintile people. There are several advantages and disadvantages for each policy alternative. HEF for all offers the highest coverage potential. However, it also requires the highest government subsidy and is the most likely to raise fiscal responsibility concerns. In addition, non-targeted expansion will face questions about the need for the government to provide coverage to the wealthy. However, there is also a cost trade-off relating to the cost of reimbursing services among the upper quintiles and the costs associated with the targeting system required to exclude them.

By contrast, the targeted approaches would better align with the principle of progressive realization and the Cambodian government's more incremental approach to policy making (Baltussen, Jansen, Tromp, & Norheim, 2017; Diaz Pedregal, Destremau, & Criel, 2015). Targeted expansion to vulnerable individuals yields cost and coverage projections similar to the lower three quintiles policy alternative. However, this approach would provide coverage based on specific vulnerability categories, which are easily identifiable, but not necessarily means-tested. So, wealthier individuals would be eligible for enrolment. This approach would also likely limit financial risk protection, a core dimension of UHC, as it would fragment eligibility within households- with some members being eligible based on vulnerability status and others not. In addition, some (individual) coverage would also be fragmented for the same person as eligibility is time-limited in some cases. For example, TB patients commonly experience long-term income loss and financial burden (Lönnroth et al., 2014).

Alternatively, targeted expansion to the uncovered 1–3 wealth quintiles would focus resources on the financially vulnerable, thus maximizing financial protection. Although Cambodia's economy is quickly developing, the poorest require a safety net to reduce the risk of health-related financial shocks (Salvatore & Campano, 2014). In addition, coverage expansion to the lower three income quintiles would likely mitigate exclusion errors whereas about one-third of people under the national poverty line (i.e. the abject poor) do not hold a Health Equity card (Kolesar et al., 2019). The current identification tools used by ID Poor could be adapted to find and enroll lower wealth income households. For these reasons, and given the similar coverage and cost projections for both targeted approaches, policy alternative 3, the targeted HEF expansion to uncovered people of the 1st–3rd wealth quintiles is considered as the best alternative to advance UHC.

4.2.2. Scenario options

4.2.2.1. Inclusion of dependents. Expanding both private employees' and civil servants' schemes to dependents has the potential to increase coverage by about 4.7 million people (4.25 million under the private sector scheme and nearly 452,000 under the civil servants' scheme). As this will reduce the overall pool of uncovered individuals, including vulnerable people, it reduces the costs associated with HEF expansion to the remaining uncovered groups which yield significant cost reductions under all three policy alternatives: (1) US\$31.3 million, (2) US\$14.2 million, and (3) \$12.8 million (all calculated using NSSF rates).

4.2.2.2. Payment for exempted services. The current NSSF rule not to reimburse priority public health services means that these costs are absorbed by the public health system. This also creates a financial disincentive for health facilities to provide these services. Focusing on policy alternative 3 and assuming that coverage is not expanded to dependents (which limits the impact of this policy to services provided to formally employed adults), the model estimates lost health facility income to be about US\$632,000 annually (2025 projection). However, if NSSF expands coverage to dependents (under both schemes), lost revenue is expected to increase to US\$12.2 million (2025 projection) as child immunization services would not be reimbursed.

4.2.2.3. Strategic purchasing and reimbursement rates. The expansion of HEF will increase demand-side financing whereas payment to providers is directly linked to service provision to the patient. This strategic purchasing approach is an important policy lever to improve both provider and health system performance (Oanh & Phuong, 2016; WHO, 2017). Strategic purchasing, the purposeful approach to purchasing health services, can yield more value for money spent by increasing efficiency, managing expenditure growth, and promoting quality

in health service delivery (Mathauer, Dale, & Meessen, 2017). For example, healthcare quality can be improved by linking reimbursements to both service provision and health facility quality scores.

Increasing the reimbursement rates would optimize this approach by maximizing the incentive to the provider. In addition, it would also increase health facility revenue to mitigate expected cost increases related to increased utilization resulting from scheme expansion. Finally, aligning the reimbursement rates would also correct the current two-tier system which provides a financial disincentive for providers to render services to patients under the HEF scheme vis-à-vis NSSF patients, potentially affecting access.

Scenario option 4 enables the adjustment of modeled estimates using three reimbursement rates (HEF, NSSF, and 70% of full costs). The cost difference between the HEF rates and the NSSF rates increases the 2025 projected costs of policy alternative 3 by US\$7.4 million (from US\$23 million to US\$30.4 million). In addition, a rate adjustment would also increase costs related to current HEF beneficiaries which is estimated to amount to about US\$8.4 million in additional annual expenditure. Revenue raising options are discussed below.

4.2.3. Economic planning

A review of Cambodia's current health financing provides perspective on the new financing commitments needed to extend HEF coverage. Although health spending targets have limitations, they can be useful for policy makers to benchmark progress (Jowett, Bernal, Flores, & Cylus, 2016). The budget approach is argued to be the most feasible and readily quantifiable (Savedoff, 2007). Fig. 4 compares four budget-based health spending targets against the (2020) Ministry of Health budget to provide some perspective relative to the cost estimates of HEF expansion. Each approach is described below. The 2020 Ministry of Health Budget, exclusive of infrastructure spending, is US\$399 million.

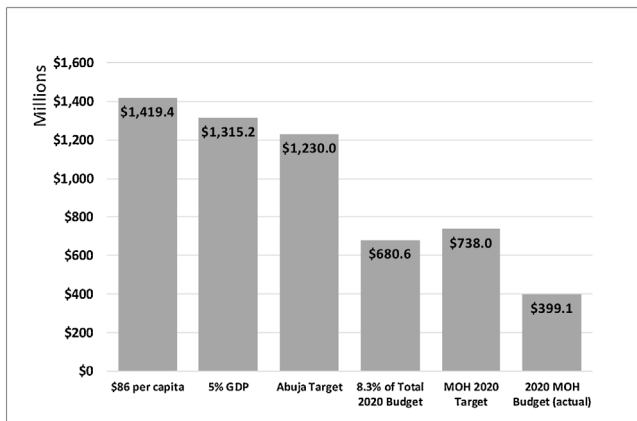


Fig. 4. Health Spending Benchmarks versus Budgeted in millions of US\$. Sources: Authors' estimates using 2020 population estimate sourced from National Institute of Statistics; Gross Domestic Product (GDP) 2018 figures adjusted to 2019 sourced from World Bank; Ministry of Health (MOH) budget targets from Ministry of Health Strategic Plan 2016–2020; Government budget figure sourced from Ministry of Economy and Finance budget law database 2010–2020, excluding capital investment budget.

The per capita target of US\$86 for low-income countries¹ is based on an initial estimate of required level of public health expenditure prepared by the *High-Level Taskforce on Innovative International Financing for Health Systems* (High-level Taskforce on Innovative International Financing for Health Systems, 2009). Subsequently, this figure has been independently reviewed and validated (McIntyre, Meheus, Røttingen, & John-Arne, 2017). Using 2020 population projections, US\$86 per capita equates to about US\$1.4 billion. This may be considered a conservative benchmark as Cambodia was reclassified as a low-middle income country in mid-2016.

Five percent (5%) of Gross Domestic Product (GDP) indicator was first proposed in the 2010 World Health Report. Subsequent analysis has reaffirmed that governments should spend at least 5% of GDP on health and progressively move toward this target (McIntyre et al., 2017; Røttingen et al., 2014). Using 2019 GDP estimates (adjusted from 2018 data), 5% GDP equates to nearly US\$1.32 billion.

The Abuja Declaration of 2001 recommended that governments allocate 15% of their budgets to the health sector. Using the 2020 Cambodian budget law figures, 15% of the total government budget equates to US\$1.23 billion. Cambodia's Health Strategic Plan targets government health expenditure as percentage of government total expenditure to reach 9% by 2020 (Ministry of Health, 2016). This equates to US\$738 million or US\$44.71 per capita. Finally, WHO data show that in 2016 the share of general government health expenditure as a percentage of general government expenditure for lower-middle income countries averaged 8.3% (Xu, Soucat, Kutzin, Brindley, & Maele, 2018). This amounts to US\$680.6 million as a proportion of Cambodia's 2020 national budget or US\$41.24 per capita. Finally, it is important to note that the most recent National Health Accounts data (2016), shows that total government health expenditure to be 22.3% of total health expenditure, with 60.4% paid out-of-pocket and 16.6% provided by donors (World Health Organization, 2019).

The difference between the 2020 MOH budget and the lowest comparative benchmark (8.3% of total budget expenditure) is US\$281.5 million. The projected cost of expanding HEF to all, to all vulnerable groups, and to uncovered 1st–3rd wealth quintiles (using NSSF rates), and is US\$87.0, US\$57.6, and US\$49.4 million, respectively. These costs can be reduced to US\$42, US\$32.1, and US\$30.4 million by expanding coverage to dependents under the NSSF schemes and reversing the current policy of non-payment for priority health services.

4.2.3.1. Revenue raising. Revenue can be generated through a variety of approaches including direct and indirect taxes, external grants and loans, out-of-pocket payments, and contributions (World Health Organization, 2020). However, there are strong arguments to focus on domestic sources, with specific attention to increasing prioritization of the health budget and improving efficiency of health expenditure (Atashbar, Assari Arani, Antoun, & Bossert, 2017; Barroy et al., 2018a; Barroy, Sparkes, Dale, & Mathonnat, 2018b).

In relation to financing the expansion to dependents under the NSSF schemes, the civil servants' scheme (NSSF-C) is paid by the State, calculated at 1% of salary. Extending this coverage to dependents is estimated to require an additional annual budget allocation of US\$2.1 million.

The formal employees' scheme (NSSF-F) is financed through contributory payments made by the employer, calculated at 2.6% of salary. The salary base for the contribution calculation is capped at approximately US\$300 US per month. Policy options to finance expansion of NSSF schemes to dependents include raising the contribution ceiling or introducing a standard payroll

¹ No equivalent target is provided for low-middle income countries.

deduction. The current estimated financing gap to cover NSSF-F dependents is US\$31.4 million per year. Increasing the salary ceiling to US\$500 would not impact on the lowest income earners and has the potential to raise US\$53 million per year.² In addition, to mitigate any potential negative impact on employers, the contribution payment for monthly salaries from US\$300–\$500 (amounting to US\$5.20 per month) could be paid by employers through a salary withholding. Alternatively, the government could introduce a standard payroll deduction for the top 10% of wage earners. A monthly deduction of US\$20 would yield nearly US\$40.1 million in new annual revenue.³ Both of these options align with the RCG's policy goal to reduce inequality as the salary contribution cap is not equitable because it favors workers at the highest end of the wealth curve by capping their contribution.

Finally, in relation to the policy recommendation to increase HEF reimbursement rates, the associated costs can be fully off-set by (partially) shifting future MOH budget increases from supply-side to demand-side financing. For example, over the past five years, the average annual increase to the MOH budget has been 9.65%. Channeling a proportion of future budget increases to the health facilities through HEF expansion and rate alignment would (partially) inject new investment to financially incentivize efficiency and quality. Directly linking payment to service provision would promote efficiency by encouraging public providers to increase service volume. Adjustment of payment amounts according to health facility quality scores can also promote healthcare quality improvement. This strategic purchasing approach aligns with Cambodia's Public Financial Management Reform Program which is currently focused on program-based budgeting and budget-policy linkages.

5. Conclusion

Policy makers may consider the additional investments estimated by the model to be significant compared to the incremental, absolute increases in government health spending over previous years. However, the cost projections related to increasing coverage under the HEF, especially when complemented with dependent coverage expansion under the NSSF schemes, retains government health expenditure well below all the international benchmarks. We contend the cost and coverage modeling tool as well as the broader health financing context, policy options and recommendations provided here will empower policy makers to advance decision making toward the achievement of UHC in Cambodia.

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² 2.6% * \$200 US * 12 months * 850,000 NSSF-F members.

³ \$20 * 12 months * 170,000 NSSF-F members.

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