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A Technical and Political Analysis of Fiscal Space and Revenue Resources of Universal Health Coverage in Thailand

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Given the challenges of sustainability and adequacy in UHC financing, this study estimates fiscal space and evaluates national health financing goals based on population projections, epidemiological trends, macroeconomic scenarios, and projected UHC expenditures, using a mixed-methods approach combining time series analysis and actuarial projections. The political economy analysis assesses potential revenue sources, including earmarked taxes, VAT increases, and broader tax reforms, while taking into account political feasibility through in-depth interviews with policymakers and academic experts.

The technical results highlight significant challenges regarding the sustainability and adequacy of public health expenditure. If Thailand is able to mobilize and reprioritize financial resources, it could offset the additional budget required for UHC up to 2030. The political economy analysis underscores the important role of the progressive Rural Doctors movement in advancing universal health coverage in the face of powerful opposing interests.

This study argues that strengthening democratic institutions and strategically applying the "Triangle That Moves the Mountain" approach—by reinforcing networks among academics, civil society, and political actors—is essential for advancing either earmarked VAT increases or broader tax reforms. However, the optimal sequencing of such strategic implementation remains an open question for Thailand and other countries.

Overall, this study serves as a warning signal for policymakers regarding the future sustainability of UHC financing. Achieving meaningful reform will require strengthening democratic processes to better represent public voices and advancing political commitment toward a more equitable society.

KEYWORDS: Universal health coverage, fiscal space, health financing, public health expenditure, SAFE goals, Thailand, political economy, tax reform, VAT

INTRODUCTION

Thailand is widely recognized as a champion of Universal Health Coverage (UHC). Despite its relatively low income per capita, the country made a bold policy decision in 2002 to finance UHC through general taxation, without requiring contributions from members. Thailand's UHC has improved the equity of health financing and provided a high level of financial risk protection. For example, out-of-pocket expenditure declined from 27% in 2002 to 11% in 2012.[1] Key features contributing to these outcomes include a tax-financed scheme supported by a substantial increase in public spending and fiscal space, a comprehensive benefits package with the gradual expansion of coverage to conditions that can lead to catastrophic household expenditure, and the strong institutional capacity of the National Health Security Office (NHSO).[2,3,4] In addition, the share of public expenditure in total health expenditure increased significantly from 63% in 2002 to 76% in 2012.[1]

Challenges to the sustainability and adequacy of Thailand's UHC are emerging from demographic and epidemiological transitions, as well as ongoing economic development. In particular, limited health system resources are under increasing pressure from financing and service delivery needs associated with an aging society, substantial gaps in urban primary health care, rising health care costs driven by technological advancement, and growing societal expectations for higher-quality services. These factors collectively place additional demands on public resources and the long-term fiscal sustainability of the UHC system.[4]

This study examines fiscal space projections and potential revenue sources over the next ten years. It aims to assess the sustainability and adequacy of UHC financing in relation to its policy goals. Finally, it evaluates possible revenue options and political strategies for expanding and sustaining UHC financing through a political economy analysis.

METHODS

Quantitative Analysis

Thailand has achieved Universal Health Coverage (UHC) through three main public health insurance schemes: the Universal Coverage Scheme (UCS), the Social Security Scheme (SSS), and the Civil Servant Medical Benefit Scheme (CSMBS). Established in 2002, the UCS is the largest and most important scheme in expanding coverage to the poor and to workers in the informal sector. It covers Thai citizens who are not protected under formal employment-based schemes, namely the CSMBS and SSS.

Current evidence indicates a high level of financial risk protection and service coverage, with relatively low unmet healthcare needs in Thailand.[3] The health financing system is predominantly tax-based, relying mainly on general government revenue. Table 1 summarizes the key characteristics of the three schemes.

Table 1. Key characteristics of the main public health insurance schemes

	Civil Servant Medical Benefit Scheme (CSMBS)	**Social Security Scheme (SSS)**	**Universal Coverage Scheme (UCS)**
Feature	State welfare as fringe benefit	Mandatory health insurance with state subsidies	State welfare as citizen entitlement
Founding year	1980	1990	2002
Targeted groups	Public employees and their parents, spouse, and, at most, 3 children	Private employees	Thais without CSMBS or SSS
Population coverage in 2020	5.2 million (8%)	11.1 million (17%)	48.8 million (74%)

	Civil Servant Medical Benefit Scheme (CSMBS)	Social Security Scheme (SSS)	Universal Coverage Scheme (UCS)
Sources of financing	Government budget (Tax-based, non-contributory)	Tripartite contribution by employees, employers, and government budget	Government budget (Tax-based, non-contributory)
Method of payment to health facilities and annual public budget per capita	Outpatient: Fee-for-service with ceiling Inpatient: Diagnostic-related groups with multiple cost bands (~12,000 THB or 400 USD per person)	Outpatient: Capitation Inpatient: Diagnostic-related groups within global budget (~7,000 THB or 220 USD per person)	Outpatient + prevention and health promotion: Capitation Inpatient: Diagnostic-related groups with global budget + fee-for-service with ceiling for specific high-cost procedures (~3,800 THB or 120 USD per person)
Financing and regulatory body	Comptroller General's Department, Ministry of Finance	Social Security Office, Ministry of Labour	National Health Security Office (NHSO)

According to Heller (2005), fiscal space is defined as "the capacity of government to provide additional budgetary resources for a desired purpose without prejudice to the sustainability of its financial position." [5] This is closely aligned with the definition of fiscal sustainability presented in the 2016 IMF Board paper, which describes fiscal space as the "room for undertaking discretionary fiscal policy relative to existing plans without undermining fiscal sustainability." [6] This study defines fiscal space for health as the availability of budgetary room that allows the government to allocate resources to desired public health objectives without compromising fiscal sustainability.

Based on Heller's framework, Tandon and Cashin (2010) identify five main sources of fiscal space for health. [7] Two categories are relevant to the scope of this study: improvements in macroeconomic conditions and increases in health sector–specific resources. However, this study does not consider budget reprioritization or efficiency gains. In addition, health sector–specific grants and foreign aid are not included, as they are not applicable in the Thai context. Further details are provided in the supplementary material.

This study conducts fiscal space projections for Thailand by analyzing public health financing levels and trends, while incorporating demographic and epidemiological changes as well as the broader macroeconomic context. It adopts a policy-oriented approach to financing the bottom-up expansion of UHC, following the framework in Cotlear et al. (2015)[8]. This study explicitly considers population coverage under UHC, the risk profile of beneficiaries and their utilization rates, input costs, the nature and scope of benefits provided, and the organization and financing of the health system. Additional descriptive details, including technical methods and underlying assumptions, are provided in the supplementary material.

Essentially, this study uses the National Health Accounts (NHA) framework for financial modelling. The NHA is designed and developed in line with the Organisation for Economic Co-operation and Development (OECD) System of Health Accounts (SHA), making it consistent and internationally comparable. The NHA reports total health expenditure (THE), which comprises general government health expenditure (GGHE) and non-government health expenditure (NGHE). Further details are provided in the supplementary material.

The projections in this study use a mixed-methods approach combining econometric time-series analysis and actuarial modelling based on extensive microdata, including diagnosis-related group (DRG) relative weights from clinical inpatient case-level data, ICD-10–based disease prevalence by age and sex, hospital cost structures, Health and Welfare Surveys, Household Socioeconomic Surveys, and Labor Force Surveys.

The analysis applies disaggregated population projections from the Office of the National Economic and Social Development Council (NESDC) to estimate the size and composition of projected UCS beneficiaries and to derive epidemiological trends by sex and age group. Prevalence rates by sex and age are calculated using reported incidence data from 2004, 2009, and 2014 from the Burden of Disease Research Program Thailand (BOD Thailand). Diseases are classified according to the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), covering 111 major diseases in the BOD Thailand database.

Given the economic impacts of COVID-19, macroeconomic assumptions are adjusted based on the most recent national forecasts for 2020 and 2021. These adjustments reflect lower projected economic growth trajectories, which in turn affect the capacity of general government expenditure and government health spending. Additional details are provided in the supplementary material, and Figure A2 illustrates the impacts of COVID-19 on GDP under alternative growth assumptions.

Macroeconomic scenarios are constructed using linear projections based on historical GDP growth rates of 2.5% and 3.3%, with average inflation rates of 1.4% and 2.0%, resulting in four macroeconomic scenarios. The study also applies a second-degree polynomial trend (1960–2019) for the share of general government expenditure (GGE) in GDP, yielding four corresponding GGE projections. Further details are presented in Figures A2–A3 in the supplementary material.

The fiscal space analysis focuses on the Universal Coverage Scheme (UCS), which covers approximately 75% of the population not included in the Civil Servant Medical Benefit Scheme (CSMBS) and the Social Security Scheme (SSS). UCS expenditure consists of two main components—outpatient (OP) and inpatient (IP) care—which together account for around 85% of total UCS expenditure. OP expenditure is projected using estimated UCS population

by sex and age group, multiplied by projected UCS capitation rates under different assumptions. UCS population is estimated using probability-based linear regression models by sex and age group, drawing on data from the National Socioeconomic Survey (SES) 2002–2018.

This study evaluates different UCS scenarios that incorporate policy alternatives for the annual growth rates of UCS capitation, defined as a per capita lump-sum payment for beneficiaries, over the next ten years. The analysis adopts the financial projections for National Health Accounts (NHA) from the Fiscal Policy Research Institute (FPRI, 2018) [9] as the baseline.

Box 1. Scenario definitions and assumptions

UCS capitation rate scenarios from different assumptions:

1. Baseline scenario
   - UCS expenditure projection which follows the FPRI report
2. Projection by cost component
   - UCS capitation increases at the annual growth rates by the public hospitals' cost structure component, which accumulatively averaged at 4%
3. Historical medical CPI
   - UCS capitation increases annually at the same rate as historical CPI of pharmaceutical and medicine manufacturing averaged at 5%
4. Historical CAGR
   - UCS capitation increases with its historical compound annual growth rate at 6.4%

The inpatient (IP) expenditure, which is based on case-based payments using diagnosis-related groups (DRGs), is projected using ICD-10 epidemiological trends disaggregated by sex and age group. These are then multiplied by the corresponding probabilities of seeking inpatient care and the average inpatient treatment cost by disease.

Disease-specific IP costs are derived from the average actual reimbursement data from the National Health Security Office (NHSO). Growth rates of IP costs are based on the average cost structure of Ministry of Public Health (MOPH) tertiary and secondary hospitals, with different growth assumptions applied to key cost components, including medical, labor, and other operational costs.

This study also endeavors to evaluate Thailand's national Sustainability, Adequacy, Fairness, and Efficiency (SAFE) goals. [10] These SAFE goals were proposed by the Committee on Resource Mobilization for Sustainable UHC, which was officially appointed by the Thai Ministry of Public Health (MOPH). Based on extensive work by the Committee's Technical Working Group, including literature reviews and a series of consultations—comprising four committee meetings, one public stakeholder consultation, and a session at the First National Conference on Thai UHC—the SAFE goals were developed and submitted to the MOPH. These goals—focusing on Sustainability, Adequacy, Fairness, and Efficiency—have also been discussed within the international health policy community. [11-14] The framework can be adapted and applied to other countries as a systematic approach for assessing the sustainability, adequacy, fairness, and efficiency of health financing systems.

This study evaluates two specific goals (Table 2).

- Sustainability goal: Health financing sources—including general government budgets, pre-paid contributions, and household spending on health—are affordable for the overall economy, the government, taxpayers, and social health insurance contributors, and are sustainable in the long run.
- Adequacy goal: Resources are sufficient to manage health service delivery systems—including essential medicines and health technologies—ensuring equitable access to essential health services for all people without incurring catastrophic health expenditures or experiencing medical impoverishment.

Table 2. SAFE Indicators

	Indicator and Goal
Sustainability	
1	Total Health Expenditure (THE) ≤ 5% of GDP
2	General Government Health Expenditure (GGHE) ≤ 20% of General Government Expenditure (GGE)
Adequacy	
3	Total Health Expenditure (THE) ≥ 4.6 % of GDP
4	General Government Health Expenditure (GGHE) ≥ 17% of General Government Expenditure (GGE)
5	Non-government Health Expenditure (NGHE) ≤ 20% of Total Health Expenditure (THE)

Source: Committee on Resource Mobilization for Sustainable UHC, 2016

The sustainability goal assesses whether health financing sources can be maintained in the long run, while the adequacy goal evaluates whether available resources are sufficient to support health systems in achieving desired outcomes such as equitable access and financial risk protection.

Political Economy Analysis

The fiscal space analysis indicates that UHC financing faces risks to both sustainability and adequacy. Consistent with evidence from 64 low- and middle-income countries (LMICs) reported in Barroy et al. (2018)[15], which identifies tax revenue expansion as, on average, the largest source of domestic fiscal space for health, this study examines specific domestic sources for potential UCS financing expansion through a political economy analysis. The main objective of this political economy analysis is to identify political strategies that can mitigate opposition and strengthen support for tax policies, thereby mobilizing more feasible revenues to expand and sustain UCS financing. This approach is motivated by the need to understand which stakeholder groups are likely to be engaged and which may present potential opposition.

The analysis draws on in-depth interviews with 11 experts in Thailand, including economists and health system specialists. The study adapted its interview guide from Bump and Powers (2014)[16]. Interviews elicited views on the adequacy and sustainability of current and future public health expenditure, potential revenue options, key drivers and factors shaping reform, relevant stakeholders and their political positions, and strategies to operationalize policy options (see Table 3).

Table 3. Agenda for political economy analysis

Interview agenda for in-depth interviews
1. Adequacy and sustainability of health financing for UCS
2. Preferable options of health financing for UCS in the future
• Tax earmarks
• VAT increase
• Wealth redistribution taxes for the universal social protection including UCS
3. Conditions on tax reform
• What could be the significant driver for changes?
• What factors could be contributed positively to changes?
• Process of policy design and implementation
o Key stakeholders?
o Positions on policy proposal?
o Strategies designed to build support and overcome opposition?

Three potential revenue options are examined: (a) earmarked taxes, (b) a VAT increase, and (c) tax reform for a universal welfare system. These options have been widely discussed by policymakers and health system scholars[17-19]. The political economy analysis evaluates their respective strengths and weaknesses and offers recommendations on political strategies to enhance the feasibility of mobilizing these resources to support the sustainability and adequacy of UHC financing in the future.

However, these options face political opposition from affected groups. Earmarked taxes are resisted by those required to pay them, as well as by state agencies that already receive

revenue from existing taxes or penalties. A VAT increase is likely to encounter opposition from households and the business sector. Tax reform—the most challenging option to implement—may face strong resistance from influential elites and capital owners. Nevertheless, both VAT increases and broader tax reform remain important potential sources for strengthening the sustainability and adequacy of fiscal space for health.

Box 2. Revenue-raising options

(a) **Earmarked taxes:** This study identifies potential revenue from earmarked taxes based on the principle of taxing harmful behaviors that impose costs on population health and the health system. These include taxes on sugar-sweetened beverages, high-sodium foods, tobacco, and alcoholic beverages; penalties from driving under the influence and speeding; and environmental emission taxes. Total revenue from this option is estimated at approximately USD 700 million in the coming years. Additional technical details are provided in the supplementary material.

(b) **VAT increase:** Increasing VAT is technically less complex than other revenue options, given the existing tax framework, and can generate substantial and immediate public revenue. While the current VAT rate is 7%, the statutory capacity allows for an increase up to 10%. However, Pitidol (2018) notes that VAT is not progressive, as lower-income households bear a higher tax burden relative to their income. Therefore, compensatory social welfare measures are necessary to ensure net benefits for the poor. TDRI (2018) estimates that a one-percentage-point VAT increase could yield around USD 2.3 billion, which could be earmarked for UHC.

(c) **Tax reform:** Given Thailand's high level of wealth inequality, tax reform aimed at redistribution is economically justified to reduce inequality, enhance macroeconomic growth prospects, and mitigate risks of political instability. Past efforts to implement instruments such as inheritance tax, land and building tax, and capital gains tax have faced challenges. Nevertheless, TDRI (2018) estimates that wealth taxes could generate approximately USD 1.6–1.9 billion in additional public revenue to support social protection schemes.

RESULTS

Quantitative Analysis

Under the baseline scenario, total health expenditure (THE) is projected to increase from USD 19 billion in 2020 to USD 26 billion by 2030, reflecting an average annual growth rate of 3.6%. Total public health expenditure is expected to rise from USD 15 billion to USD 19 billion over the same period, with an average annual growth rate of 3.1%. The public share of health expenditure is projected to decline slightly, from 76% in 2011–2020 to 74% in 2021–2030. Expenditure under the UCS is projected to grow from USD 4.3 billion in 2020 to USD 5.8 billion in 2030, maintaining a steady annual growth rate of 3.1%. Detailed results on financial projections, growth rates, and expenditure shares across different scenarios are provided in Tables A4–A23 in the Supplementary Material.

In evaluating the SAFE goals, the sufficiency and sustainability of fiscal space for UHC face notable challenges, as shown in Table 4. Total health expenditure (THE) as a share of GDP is projected to reach 5.4% by 2030, exceeding the SAFE benchmark of 5%. Similarly, the share of general government health expenditure (GGHE) in total general government expenditure (GGE) is projected to reach 22% by 2030, surpassing the SAFE threshold of 20% if public revenue is not expanded. These trends suggest increasing pressure on the public budget and potential trade-offs with other sectors, such as education, infrastructure investment, and national security.

The share of non-governmental health expenditure (NGHE) in total health expenditure (THE) is projected to reach 27% by 2030. However, excluding private insurance, the NGHE share declines to 17%, indicating that the primary driver of NGHE growth is private health insurance. Detailed results on SAFE indicators under different scenarios are presented in Tables A24–A26 of the Supplementary Material.

Table 4. SAFE goals and projections from baseline scenario

		Baseline scenario (min-max), %	
	SAFE Goal	**2020**	**2030**
THE as % GDP	≤ 5%	4.4 (4.3-4.4)	5.4 (4.9-5.9)
GGHE as % GGE	≤ 20%	19.9 (19.6-20.2)	21.6 (19.6-23.8)
Non-governmental THE as % of THE	≤ 20%	24	27

Note: THE=Total health expenditure, GGHE=General government health expenditure, GGE=General government expenditure, and NGHE=Non-governmental health expenditure. The minimum and maximum of the estimated budget are in parentheses.

To assess the budgetary implications of exceeding the SAFE thresholds, this study evaluates two indicators: THE surpassing 5% of GDP and GGHE exceeding 20% of GGE, as shown in Table 5. When THE exceeds 5% of GDP, the additional budget required for GGHE is estimated at approximately USD 0.9 billion in 2030, implying an additional USD 880 million for UCS. When GGHE exceeds 20% of GGE, the additional GGHE requirement is about USD 0.8 billion in 2030, corresponding to roughly USD 260 million for UCS. These estimates are based on moderate scenarios. Further results on required budgets under alternative scenarios are provided in Tables A27–A32 in the Supplementary Material.

Table 5. Required budget exceeding from the SAFE goals in 2030 (in million USD)

	Required Public Budget	
Required amount of:	**THE > 5% of GDP**	**GGHE > 20% of GGE**
Government health expenditure (GGHE)	900 (97-1,417)	879 (244-1,397)
UCS expenditure	367 (42-579)	259 (77-412)

Note: The minimum and maximum of the estimated budget are in parentheses.

Political Economy Analysis

Adequacy and sustainability of health financing for UCS

All economists interviewed for this study agreed that the fiscal space for UCS is inadequate and its sustainability is a concern. The UCS budget, determined by the government and the Ministry of Finance, has consistently fallen short of the levels proposed by the health sector. This underfunding constrains the quality of health care services, which would require a

more substantial increase in the UCS capitation rate. Consequently, expanding revenue sources appears unavoidable.

Both health system experts and economists emphasized the need to improve efficiency and reduce inequality in health financing, particularly within the CSMBS, which has significantly higher per capita expenditure. In addition, some health system experts noted that reducing unwarranted practice variation could yield substantial cost savings.

Preferred options for future health financing of UCS: earmarked taxes, VAT increases, or tax reform

The political economy analysis indicates that earmarked taxes face limitations due to their relatively low revenue potential, even though they are legally feasible and encounter less opposition than other options. In contrast, a VAT increase is technically straightforward to implement and can substantially expand government revenue capacity. However, it is likely to face significant resistance from both households and the business sector, particularly if tax revenues are not allocated and used efficiently to deliver tangible benefits to taxpayers.

Tax system reform aimed at increasing taxation of high-income and high-wealth groups can provide a more sustainable and adequate source of health financing, and is economically justified in a country with high levels of inequality. However, such reforms are considerably more difficult to implement than a VAT increase, particularly due to resistance from powerful interest groups at both the policy and legislative levels. For example, Thailand has struggled to effectively implement inheritance taxes and land and building taxes for redistributive purposes, despite decades of policy efforts. Existing tax rates remain low compared to those in advanced economies, and exemptions and loopholes persist, allowing especially high-wealth individuals to minimize their tax liabilities.

Conditions for tax reform

Expanding revenue through taxation is politically challenging and requires a confluence of enabling factors at the right time. Interviewees frequently cited the example of the "Rural Doctors," whose expertise, social networks, and institutional positions were instrumental in the design and implementation of UCS. At its inception, favorable political economy conditions—particularly democratic electoral dynamics—supported comprehensive health system reform. In contrast, some respondents suggested that a fiscal or health system crisis may be necessary to catalyze substantial reforms in health financing and taxation.

A key determinant of successful reform is public confidence that tax contributions translate into tangible welfare benefits, alongside trust that tax-funded spending is free from corruption. In this regard, Thailand must shift public perceptions of UCS from a narrowly targeted social assistance program for the poor to a broader understanding of it as a social and economic mechanism for risk pooling and shared welfare.

Achieving transformative change—such as tax system reform toward a welfare state model and ensuring the sustainability and adequacy of UHC financing—requires strengthening democratic institutions that reflect citizens' preferences. This includes enabling political parties to propose welfare-oriented policies and allowing voters to select among them through electoral processes.

Experts also emphasized the importance of budget reprioritization, particularly reducing expenditures that are economically inefficient or yield limited social benefit, such as disproportionately high defense spending in certain periods. Such reallocation could expand fiscal space to address pressing health financing needs, including responses to public health emergencies and population aging. This, again, depends on a political environment aligned with democratic norms and accountability.

Regarding policy design and implementation, stakeholder positioning and corresponding political strategies are summarized in Table 6. Overall, prospects for reform remain challenging. Governments may hesitate to increase VAT due to concerns over political popularity, while tax reform is likely to face strong opposition from wealthy elites with significant political influence. Although officials in the Ministry of Finance tend to prioritize fiscal stability, they may be supportive if the necessity of increased health financing is clearly demonstrated.

Therefore, collaboration between health system researchers and reform-oriented technocrats in the Ministry of Public Health and the Ministry of Finance is essential to generate and communicate evidence effectively to both the public and political actors. Additionally, medical professionals—who often command high levels of public trust—can play a crucial role in raising awareness about inequality and demonstrating how redistributive taxation and public spending, including UHC, can generate net societal benefits.

Table 6. Stakeholders, positions on policy reform, and political strategies

Key stakeholders	Positioning on policy	Strategies to build support and mitigate the opposition
Population and business sectors	• Upper middle-income and elites do not agree, because they cannot see their benefits • Poor and lower middle-income will have benefits but pay more tax • Domestic and international capitalists will oppose	• Most importantly, promote and sustain democracy at this critical time of transition • Academic research and communication to inform the society on 'net benefits' from tax and redistributions, and encourage their willingness to pay • Policy proposal from political parties, then discussion by citizens to understand their needs, and strategic prioritize policy agenda led by the voice of people

Key stakeholders	Positioning on policy	Strategies to build support and mitigate the opposition
		• Eliminate corruption by promoting transparency and accountability • Change the societal views on tax as burden to be a legal and moral duty • Educate middle or upper class the importance of economic and political benefits of reducing the inequality gap • Public hearing from the impacted population and civil society organizations • Reinforce the network of civil organizations who support the state welfare system • Engage public mass media to popularize the ideas and raise people's voices • Inform society on how many years to have the financial problems with the health system
Government and politicians	• Currently, the budget is limited, and COVID-19 makes the fiscal space worse with less political commitment to expand health financing • Politicians from reformist parties want to push the agenda forward • Political parties tend to commit stronger in local election areas and lack of broader view • Some governmental parties do not commit to what they promised in the election campaigns	• Create a national agenda on UHC sustainability and adequacy • Encourage people and civil organization movements on earmark VAT and wealth taxes • Ensure political parties to gain, not lost, popularity by informative measures customized each sub-population of voters • Use COVID-19 as an evidence to advance support on strengthening the health system • Educate people to elect parties from policy, not other strategical agenda

Key stakeholders	Positioning on policy	Strategies to build support and mitigate the opposition
		driven by propaganda radicalization • Sustain democracy development, as the military coup governments tend to prioritize budget over army spending
Relevant state agencies (such as Ministry of Public Health and Ministry of Finance)	• Reformist technocrats will support • Conservative bureaucrats tend to neglect, if not oppose • If we can gain mutual understanding in some influential professionals such as doctors, it could be accomplished as an outstanding example of the "rural doctors" movement	• Provide evidence on the necessity of expanding the fiscal space • Promote collaborations with the civil sector and the academic networks for research and dissemination initiative
Budget committee members (such as budget commissioners) and vetting committee members	• Appointed by political party quotas, their party's agenda influence them • Committee members appointed by junta governments have no checks and balances	• Strengthen and unite pressure from people's voices through the democratic system to demand for efficient health and welfare spending and reduce the unproductive expenditure

Source: Derived from 11 in-depth interviews with notable policy makers and scholars in economics and health system of Thailand.

DISCUSSION

Building on the OECD-standardized National Health Accounts framework, this study projects the fiscal space for UHC, evaluates these projections against national goals of sustainability and adequacy, and subsequently examines potential tax revenue sources through a political economy analysis.

The health financing projections highlight significant challenges to adequacy and sustainability in Thailand over the next decade. Total health expenditure, general government health expenditure, and UHC spending are all projected to increase by roughly half of their current levels, while key indicators are expected to exceed established adequacy and sustainability thresholds.

Nevertheless, there remains scope to mobilize additional revenues to expand and sustain health financing, particularly through increased allocation of health-specific resources. However, the feasibility of these options is inherently shaped by the influence of politically and economically powerful interest groups.

The financial strategy to mobilize sufficient resources to meet desired health sector expenditures depends critically on governmental administrative capacity.[20] With a slow and fragile economy following the 2014 coup d'état, further exacerbated by COVID-19, and compounded by fiscal pressures from debt repayments and competing economic and social priorities, it is challenging to maintain—let alone expand—the fiscal space for health to meet future coverage goals. Barroy et al. (2016, 2017) [21-22] also emphasize concerns about sustaining, rather than expanding, fiscal space for health, particularly in contexts where countries face broader fiscal constraints or reductions in health budgets.

The introduction of UCS as a bold political decision to achieve UHC in Thailand has been sustained not solely by technical feasibility, but by the strategic application of the "Triangle that Moves the Mountain."[23] Wasi (2000)[24] pioneered this concept as a political

strategy for addressing complex and deeply rooted challenges, emphasizing the need for collaboration beyond technical expertise to include civil society and political commitment.[23,25-27]

The "triangle" represents the interaction of three forces: (a) the generation and effective use of knowledge as the *power of wisdom*, (b) strong social engagement and collective action as *social power*, and (c) political commitment and leadership as po*litical power*. [23-24] In driving meaningful social change, this framework underscores the importance of **strengthening all three interconnected dimensions**, as their alignment is critical for navigating political economy dynamics and advancing national development.

The findings from the political economy analysis underscore the importance of strengthening democratic governance. Accordingly, this study argues that Thailand should strategically reapply the "Triangle that Moves the Mountain," with stronger civil society engagement and greater political accountability grounded in evidence-based agendas, to ensure long-term financial sustainability.

Building on its historical trajectory, Thailand can continue to advance along this path—described by Harris (2017)[28] as a sustained movement led by medical professionals—leveraging their expertise, social networks, and institutional influence to overcome opposition from powerful interest groups and support the institutionalization of policy reforms.

Implications for Policy

COVID-19 and its associated economic shocks are likely to disrupt the trajectory of health system progress, which has already been constrained by limited resources. After accounting for these impacts, total health expenditure is projected to decline by around 10% by 2030.

Amid increasingly competitive demands on the public budget, the health system must

safeguard and strengthen the right to quality health care through enhanced collaboration among stakeholders across the political economy landscape. In this context, medical professionals—who are highly trusted in Thailand—can play a pivotal role in advancing policy agendas that promote better population health outcomes.

At the same time, Thailand must urgently prepare for rising health financing needs driven by rapid population aging. Measures such as a VAT increase or broader tax reform will likely be necessary to meet future budgetary demands. In addition, budget reprioritization—such as reducing military expenditures or other less productive spending—can help expand fiscal space for health. Achieving these reforms will depend on strengthening democratic processes that amplify citizens' voices in policymaking and enable political parties to advance welfare-oriented agendas toward a sustainable UHC system in Thailand.

Key political strategies emerging from the political economy analysis include:

(1) Building a national agenda centered on the sustainability and adequacy of UHC.
(2) Educating and informing the public about the need to expand fiscal space for health.
(3) Strengthening networks among reform-oriented medical bureaucrats, research institutions, and civil society organizations to facilitate the exchange of knowledge and policy agendas with political actors. More broadly, this underscores the importance of reinforcing democratic governance and strategically reapplying the "Triangle that Moves the Mountain," with strong interconnections among academic expertise, social mobilization, and political commitment.

Limitations

The technical analysis does not examine inefficiency or budget reprioritization, both of which could translate into substantial expansion of domestic fiscal space for health, as

highlighted by Barroy et al. (2018)[15]. Inefficient spending under the CSMBS for state employees, along with the use of unnecessary drugs and health technologies, could yield substantial cost savings. In addition, budget reprioritization represents a significant potential source of health financing, particularly given that military spending was about 40% higher than the MOPH's budget in 2020 and has been growing at a faster rate.

The political economy analysis provides a broad discussion of the factors that may influence health financing reforms and the strategies needed to secure support from key stakeholders. However, it does not specify the sequencing of implementation—namely, how, to whom, and in what order strategic actions should be carried out within a defined timeframe. Developing such an implementation roadmap remains an important area for future research in Thailand and other settings.

CONCLUSION

As a goal attainable for all, UHC not only safeguards the health and well-being of individuals and communities but also contributes to building fair, stable, and cohesive societies (Chan and Brundtland, 2016) [29]. Phongpaichit and Baker (2015) [30] further argue that a more equal society is a "prerequisite for achieving a more peaceful and cohesive society in the long run" in Thailand. Therefore, UHC can be viewed not only as a health policy but also as a broader political and economic strategy for reducing inequality.

As an achievable goal for all, UHC does not only safeguard the health and well-being of individuals and communities, but it also helps build fair, stable, and cohesive societies (Chan and Brundtland 2016). Phongpaichit and Baker (2015) pointed out that the more equal society is a "prerequisite for achieving a more peaceful and coherent society in the long run" for Thailand. Therefore, UHC should be viewed not only as a health policy but also as a political and economic strategy for reducing inequality.

Skepticism may arise regarding the potential and feasibility of revenue sources to generate a sustainable flow of funding for population health. However, Thailand's progress in UHC demonstrates that meaningful change is achievable. What once seemed unlikely—providing financial protection against catastrophic health expenditures and impoverishment for all—has become a reality. Two decades later, UHC has evolved into a global commitment, guiding countries toward more equitable, sustainable, and affordable health care systems.

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This study also pays tribute to the late Dr. Sanguan Nittayaramphong, a key founder of the UCS and the first Secretary-General of the NHSO.

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DECLARATION OF INTEREST STATEMENT

The author declares to have no conflicts of interest.

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SUPPLEMENTAL MATERIAL

A Technical and Political Analysis of Fiscal Space and Revenue Resources of Universal Health Coverage in Thailand

TABLE OF CONTENTS

INTRODUCTION

This supplementary appendix provides technical details and full results of the financial projections, evaluation of the national health financing ("SAFE") goals, and potential revenue sources for health financing. The study estimates fiscal space and evaluates national health financing goals based on population projections, epidemiological trends, macroeconomic scenarios, and projections of UHC expenditure, using a combination of time series analysis and actuarial methods.

Full technical results for all macroeconomic scenarios and policy options on the capitation rates of the Universal Coverage Scheme (UCS) are presented in this supplementary material. The fiscal space projections incorporate the economic consequences of the COVID-19 pandemic. Financial projections and evaluations are conducted through 2040; however, the main manuscript reports key findings only up to 2030, for which forecasts are expected to be more reliable.

The projected expenditure and SAFE indicators for 2030 are broadly similar before and after adjustments for COVID-19. In contrast, projections for 2040 diverge substantially between the pre- and post-COVID-19 scenarios, reflecting revisions to underlying assumptions.

MATERIALS AND METHODS

Conceptual Framework

When a health system is well funded and effectively manages risk pooling between healthy and sick populations, individuals can access health care based on need rather than ability to pay (Kruk, 2013). Brearley et al. (2013) recommend financing public insurance through progressive taxation and eliminating point-of-care charges, which disproportionately burden the poor. This approach has been shown to increase access and reduce medical impoverishment and catastrophic health expenditure in both emerging and high-income countries.

However, government resources are limited. Insufficient and unsustained funding is widely recognized as a major constraint in achieving improved health outcomes (Jamison et al., 2006). In general terms, fiscal space is defined as "the capacity of a government to provide additional budgetary resources for a desired purpose without jeopardizing the sustainability of its financial position" (Heller, 2006).

Fiscal space for health can broadly be grouped into five categories (Tandon and Cashin, 2010):

(i) Macroeconomic conditions such as economic development and increases in overall government revenue that, in turn, lead to increases in government spending for health.

(ii) A re-prioritization of health within the government budget decisions by reducing less productive expenditures.

(iii) An increase in health sector-specific resources, e.g., through sugar and tobacco taxation, or increase in the VAT rate for earmarks.

(iv) Health sector-specific grants and foreign aid.

(v) An increase in the efficiency of existing government health outlays.

Barroy et al. (2018) emphasize that fiscal space for health analyses should pay particular attention to the potential for expansion through improved use and performance of public resources.

This study conducts a fiscal space analysis for Thailand by examining public health financing levels and trends, while incorporating demographic and epidemiological dynamics as

well as the macroeconomic context. It adopts a policy-oriented approach to the bottom-up expansion of UHC (Cotlear et al., 2015), explicitly considering population coverage, the risk profile and utilization patterns of beneficiaries, input costs, the nature and scope of benefits, and the organization and financing of the health system.

Evaluation of the National Health Financing Goals

This study evaluates Thailand's national health financing goals—Sustainability, Adequacy, Fairness, and Efficiency (SAFE). Although Thailand has made substantial progress toward UHC, concerns remain regarding its financial sustainability. In response, the Ministry of Public Health established a national committee on resource mobilization for sustainable UHC to develop policy recommendations.

Building on the extensive work of the Technical Working Group and the Committee on Resource Mobilization for Sustainable UHC, Thailand established four national goals—Sustainability, Adequacy, Fairness, and Efficiency (SAFE) (Committee on Resource Mobilization for Sustainable UHC, 2016).

There are two goals relevant to this study which are sustainability and adequacy.

- **Sustainability goal**: Health financing sources—including the general government budget, prepaid contributions, and household spending on health—are affordable for the overall economy, the government, taxpayers, and social health insurance contributors, and can be sustained in the long run.
    - Indicator and Target 1: By 2022, Total Health Expenditure (THE) does not exceed 5% of GDP

- Indicator and Target 2: By 2022, General Government Health Expenditure (GGHE) does not exceed 20% of General Government Expenditure (GGE)

- **Adequacy goal**: Resources are sufficient to support health service delivery systems, including essential medicines and health technologies, ensuring that all individuals can equitably access and use essential health services without incurring catastrophic health expenditure or experiencing medical impoverishment.
  - Indicator and Target 3: Total health expenditure (THE) is not less than the level of 4.6 % of GDP
  - Indicator and Target 4: GGHE as % of GGE is not less than the level at 17% of GGE
  - Indicator and Target 5: Non-government health expenditure (NGHE) does not exceed 20% of THE

National Health Account

This study uses the National Health Accounts (NHA) for 1994–2016 as the framework for financial modeling. The NHA is a time series of Thailand's health expenditure compiled by the International Health Policy Program, Ministry of Public Health (IHPP MOPH). It is developed in accordance with the System of Health Accounts (SHA) of the Organisation for Economic Co-operation and Development (OECD), ensuring consistency and comparability across countries.

Total health expenditure is broadly disaggregated into public and private components, namely General Government Health Expenditure (GGHE) and Non-government Health Expenditure (NGHE). GGHE comprises spending on the Universal Coverage Scheme (UCS), the Ministry of Public Health (MOPH), the Civil Servant Medical Benefit Scheme (CSMBS), the

Social Security Scheme (SSS), and other public sources. NGHE includes private insurance, household out-of-pocket expenditure, and other private spending.

Projections for the UCS are based on alternative policy scenarios for capitation growth. Projections for other components are derived from second-order polynomial trends, following the existing time-series econometric models developed by the Fiscal Policy Research Institute (FPRI).

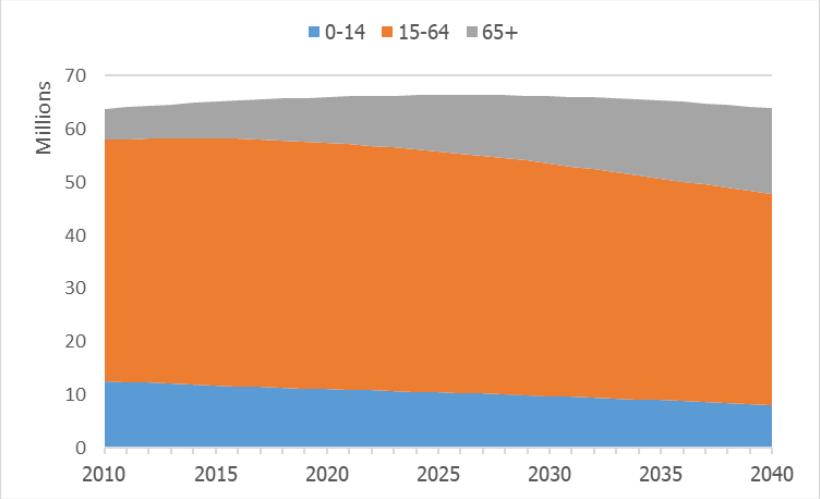
Population Projection

Population projections provide the basis for estimating the size and composition of UCS beneficiaries, as well as epidemiological trends disaggregated by sex and age group. This study uses population estimates from the Office of the National Economic and Social Development Council (NESDC). However, NESDC projections are available only by age group or by sex, but not jointly.

To address this limitation, the study applies age–sex distribution shares from the World Bank (WB), which are based on the United Nations World Population Prospects (2019 Revision). While WB and NESDC projections share a similar age structure, discrepancies exist in total population levels across data sources. This study adopts NESDC projections as the baseline, given their official status, and combines them with WB age–sex distribution shares.

Population figures are disaggregated by sex and into five-year age groups (0–4, 5–9, 10–14, …, 70–74, 75–79, and 80+).

Figure A1: Population projection



Source: NESDC

According to official population projections, the population aged 65 and over will increase from 8.6 million in 2020 to 12.7 million in 2030 and 16 million in 2040—representing increases of 48% and 87% over the next ten and twenty years, respectively.

Epidemiological Projection

This study uses disease incidence data for 2004, 2009, and 2014 from the Burden of Disease Research Program Thailand (BOD Thailand), under the International Health Policy Program, Ministry of Public Health (IHPP MOPH). Diseases are classified according to the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10).

This study uses incidence data from BOD Thailand to estimate historical prevalence rates by sex and age group, which are then used to project epidemiological trends using linear models. The dataset covers 111 specific diseases. Population figures by sex and age group are obtained

from the NESDC, as described earlier. Age group classifications follow the Global Burden of Disease (GBD) Study: 0–4, 5–14, 15–29, 30–44, 45–59, 60–69, 70–79, and 80+.

Table A1: Aggregated incidence of diseases (in thousand)

ICD-10	Sub-causes	Causes	2004	2009	2014
A	Infectious diseases	Infectious diseases	5,762.8	7,292.5	7,874.7
B	Respiratory infections	Infectious diseases	51,085.4	48,978.9	50,183.7
C	Maternal conditions	Infectious diseases	194.5	151.1	111.8
D	Perinatal conditions	Infectious diseases	7.4	7.8	6.0
E	Nutritional disorders	Infectious diseases	10,562.7	15,510.7	15,394.8
F	Cancer	Non-communicable diseases	120.5	137.7	189.5
G	Benign neoplasms	Non-communicable diseases	<0.01	<0.01	<0.01
H	Diabetes	Non-communicable diseases	192.1	202.1	249.3
I	Other endocrine and metabolic disorders	Non-communicable diseases	9.2	9.2	8.2
J	Mental disorders	Non-communicable diseases	2,563.5	3,077.2	860.4
K	Neurological disorders	Non-communicable diseases	56.7	80.8	107.9
L	Sense disorders	Non-communicable diseases	171.1	448.0	266.3
M	Cardiovascular diseases	Non-communicable diseases	120.3	144.8	211.6
N	Chronic respiratory diseases	Non-communicable diseases	267.8	195.0	260.5
O	Digestive disorders	Non-communicable diseases	482.4	498.2	245.5
P	Genito-urinary diseases	Non-communicable diseases	117.4	328.1	396.3
Q	Skin diseases	Non-communicable diseases	<0.01	<0.01	<0.01
R	Musculo-skeletal diseases	Non-communicable diseases	7,288.4	6,344.0	4,785.0
S	Congenital anomalies	Non-communicable diseases	7.0	6.4	7.4
T	Oral conditions	Non-communicable diseases	6,959.1	9,179.3	23,635.2
U	Unintentional injuries	Injuries	1,197.1	1,268.1	1,909.9
V	Intentional injuries	Injuries	203.4	154.9	136.9

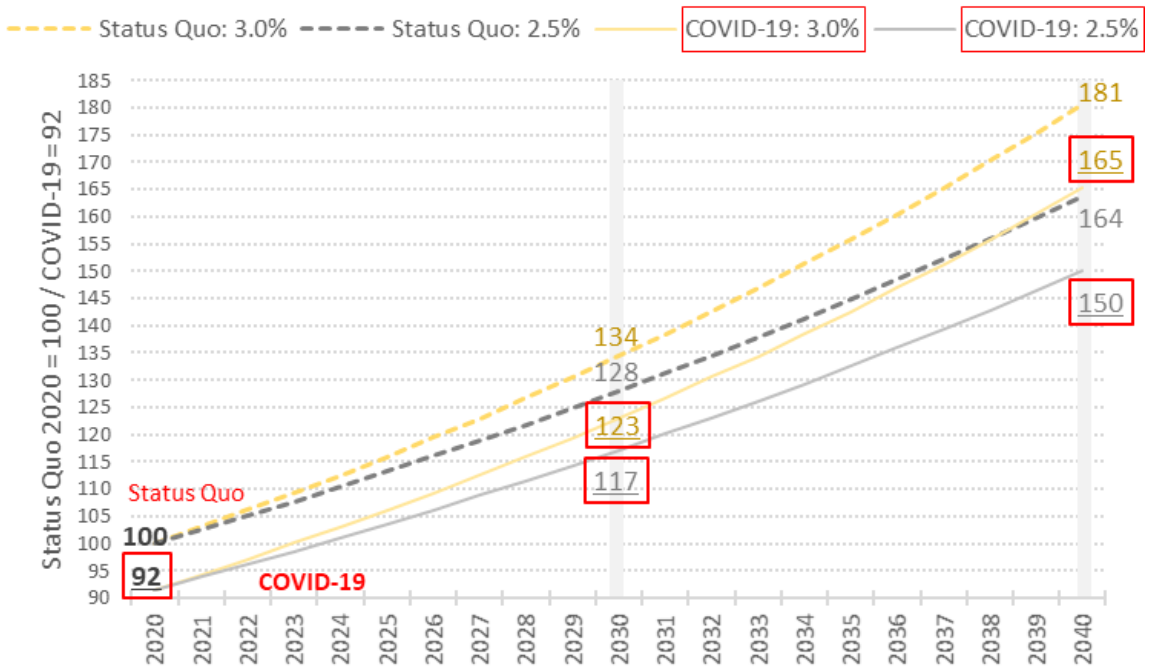
Source: BOD Thailand of IHPP, Ministry of Public Health

Economic Impacts from COVID-19

This study also considers the potential economic impacts of COVID-19. The International Monetary Fund (IMF) projected in October that the global economy would contract by 4.4% in 2020, followed by a 5.2% recovery in 2021. Similarly, the NESDC's economic outlook in November forecast that the Thai economy would decline by 6% in 2020 before recovering to 3.5–4.5% in 2021.

Accordingly, the assumed long-term macroeconomic growth rates of 2.5% and 3% are influenced by the economic shock in 2020. After adjusting for official GDP figures, the results suggest that the most optimistic 2040 scenario under COVID-19 is comparable to the worst-case scenario under the pre-COVID-19 baseline.

Figure A2: Impacts of COVID-19 on GDP under different growth assumptions



Note: This study uses a previous economic outlook (World Bank, Thailand Economic Monitor January 2020) with a 2.7% growth for 2020, as a benchmark scenario before COVID-19 (status quo). The COVID-19 effects on GDP in 2020 is calculated by the GDP growth from 2019 at -6.0%, instead of 2.7%.

The COVID-19 pandemic has long-term impacts not only on economic growth but also on government revenue and budgets, which in turn determine the capacity for public spending on health.

This study assumes that General Government Expenditure (GGE) increases by 3% in 2021 and decreases by 6% in 2022, in line with announcements from the Budget Bureau. Thereafter, GGE is projected to evolve as a share of GDP under each macroeconomic scenario, based on assumptions regarding GDP growth and inflation.

For health expenditure, the study specifies assumptions for General Government Health Expenditure (GGHE) and Non-government Health Expenditure (NGHE), which together constitute Total Health Expenditure (THE). Due to limitations in detailed budget data, GGHE components are assumed to remain at 2020 levels for 2021 and 2022, before growing according to their respective trends. Similarly, NGHE components are assumed to remain at 2019 levels for 2020 and 2021, and to follow their projected trends thereafter.

Assumptions for household health expenditure are consistent with the income elasticity of health demand estimated by Tangtipongkul (2016). Using income elasticities weighted by predicted probabilities from Tangtipongkul (2016), the results suggest that changes in income have a negligible effect on household health expenditure.

Total health expenditure (THE), aggregated from GGHE and NGHE, is projected to decline modestly as a result of COVID-19. For example, projected THE in 2040 decreases from USD 29 billion in the pre-COVID-19 scenario to USD 26 billion after revision, representing a reduction of approximately 10%.

SAFE indicators remain largely unchanged, except for GGHE as a share of General Government Expenditure (GGE). In the pre-COVID-19 scenario, GGHE was projected to reach 23–24% of GGE in 2030; this estimate declines to around 21% after incorporating the effects of COVID-19.

Macroeconomic Scenarios

Four macroeconomic scenarios are constructed based on assumptions about GDP growth and inflation. The study assumes annual GDP growth rates of 2.5% and 3.3%. The 3.3% assumption reflects the average annual growth over the past decade, while the 2.5% assumption represents a pessimistic scenario in which a declining working-age population and limited productivity-enhancing investment constrain economic growth.

Average inflation rates of 1.4% and 2% are assumed, based on historical trends over the past 10 and 20 years, respectively. Given the Bank of Thailand's inflation-targeting framework, these assumptions are considered plausible over the long term. GDP and inflation data are drawn from the World Bank's World Development Indicators database.

Data on General Government Expenditure (GGE) are obtained from the Ministry of Finance. GGE, expressed as a share of GDP, is projected using a second-degree polynomial time trend based on historical data from 1960 to 2019. Correspondingly, four GGE trajectories are generated, consistent with the four macroeconomic scenarios defined by the GDP and inflation assumptions.

These macroeconomic indicators are further adjusted to reflect the impacts of COVID-19, as discussed above. As a result, projected GGE follows the contraction in GDP during 2020–2021 before returning to its long-term trend.

Figure A3: Macroeconomic scenarios

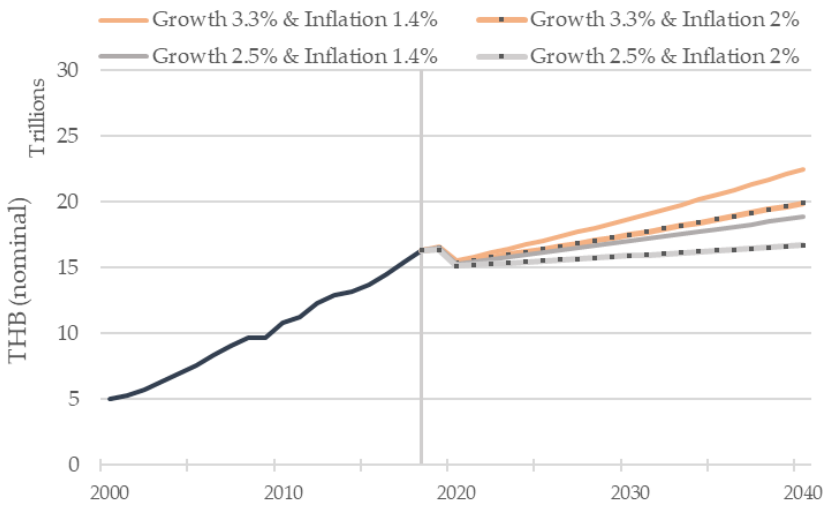
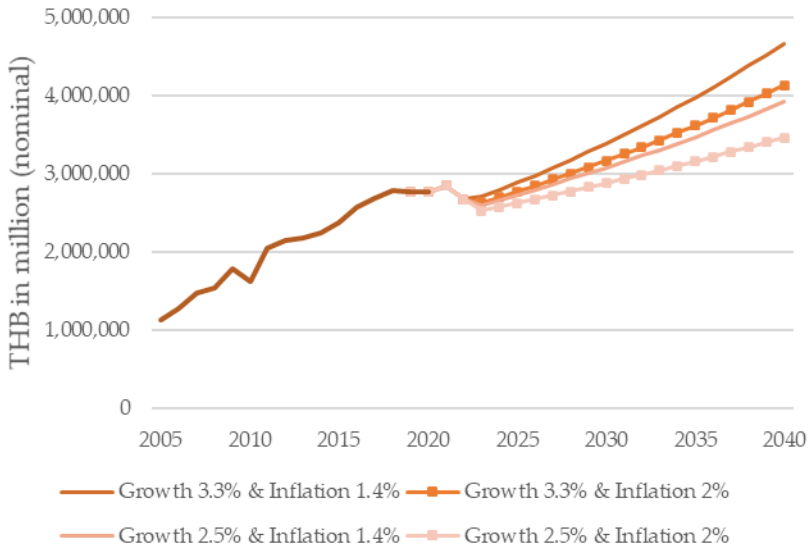


Figure A4: General government expenditure (GGE)

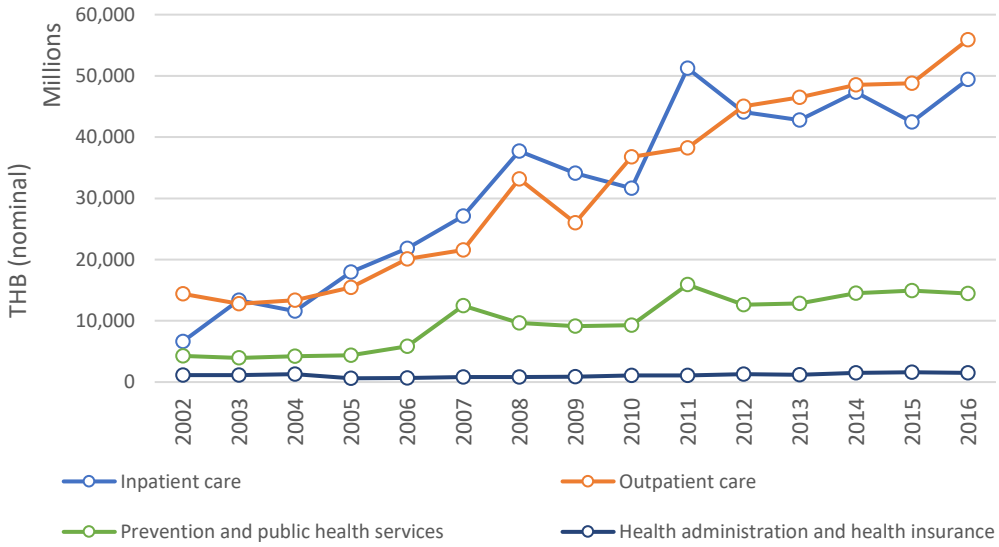


Projections for UCS Expenditure

According to the National Health Accounts (NHA), the major components of UCS expenditure are outpatient (OP) and inpatient (IP) care, which together account for approximately

85% of total UCS spending over the past decade. This study therefore focuses on OP and IP expenditure components.

Figure A5: Public expenditure on UCS



Outpatient component of UCS expenditure

The outpatient budget for the UCS is calculated as the product of the total number of beneficiaries and the capitation rate. UCS population coverage by sex and age group is estimated using a linear probability model based on national household survey data from the Socio-Economic Survey (SES) for 2002–2018. The total UCS population is then obtained by aggregating these estimates across sex and age groups. This approach avoids uncertainties related to future changes in the structure of formal and informal employment and unemployment, which may affect UCS coverage across demographic groups.

The UCS capitation rate increased from THB 1,202.4 in 2002 to THB 3,426.6 in 2019, corresponding to an average annual growth rate of 6.4%. Growth was higher during 2002–2010 (9.0%) and slowed to 3.8% during 2011–2019. This indicates that capitation growth has moderated over time and has generally remained below the levels proposed to the government.

Accordingly, the study models capitation rate growth under three UCS scenarios, each based on different assumptions.

1. Cost structure using growth rates by cost component at 4%

The shares of cost components are based on the average cost structure of Ministry of Public Health (MOPH) hospitals in fiscal year 2019. The assumed labor cost growth rate of 4% is informed by historical trends in hourly earnings of health professionals from the Labor Force Survey (LFS), 2011Q1–2018Q1. The average annual growth rate of hourly earnings is 3.7%, while the estimated time-trend coefficient is 4.1%, based on regression analysis using quarterly LFS data from 2001Q1–2018Q1. The regression controls for medical profession, education level, years of experience, province, and urban–rural location.

The growth rate of medical costs is assumed to be 5%, based on the average consumer price index (CPI) [1] for the pharmaceutical and medical manufacturing sector. The growth rate of other costs is set at 1.4%, reflecting the average inflation rate over the past decade.

Table A2: Cost structure and corresponding growths of UCS costs

	Share	Annual growth	Reference for annual growth
Labor cost	60%	4.0%	Labor Force Survey 2001Q1-2018Q1
Medical cost	30%	5.0%	Pharmaceutical and Medicine Price Index 2003-2018
Others	10%	1.4%	Historical 10-year inflation

Note: Average shares of cost structure from the MOPH hospital-level data

2. Average CPI of pharmaceutical and medicine manufacturing (2003-2018) at 5%

The producer price index (PPI) for pharmaceutical and medicine manufacturing for 2003–2018 is obtained from the U.S. Bureau of Labor Statistics. This index tracks prices received by manufacturers and collectively spans the value chain across eight broad therapeutic categories and

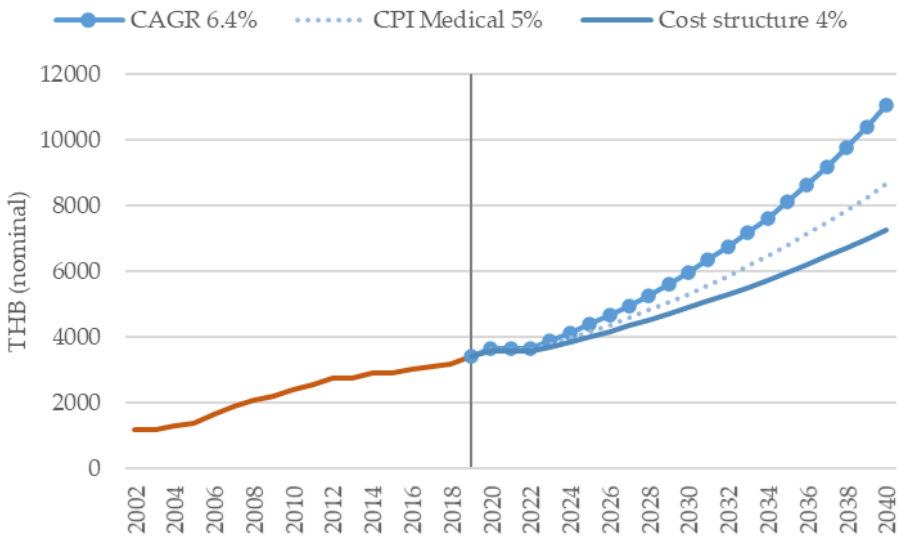
[1] Data from the Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org/series/PCU32543254).

28 detailed therapeutic classes. As the composition of products in the pharmaceutical sector evolves over time, the PPI sample is periodically updated—typically every 5 to 7 years—with supplemental samples introduced annually to incorporate new products and maintain coverage. The average annual growth rate of the index is 5.2% over the period 2009–2018.

3. Historical capitation growth (2002-2019) at 6.4%

This assumption is based on the historical compound annual growth rate of the UCS capitation rate.

Figure A6: Projections of UC's capitation per head with different assumptions



Inpatient component of UCS expenditure

Inpatient expenditure under the UCS is financed through case-based payments using diagnostic-related groups (DRGs), within a pooled budget for inpatient care. Payments per admission are fixed according to the Thai DRG system.

This study projects UCS inpatient expenditure by combining ICD-10–based epidemiological trends by sex and age group with estimates of the probability of inpatient care utilization for each cohort, and the average treatment cost per case by disease.

For epidemiological trends, this study uses ICD-10–based prevalence rates by sex and age group, as described in the epidemiological projection section. The probability of inpatient care utilization by sex and age group is estimated using a linear probability model based on individual-level data from the Health and Welfare Survey (2007, 2009, 2011, 2013, 2015, and 2017).

Inpatient treatment costs by disease are derived from actual reimbursement data from the National Health Security Office (NHSO). The analysis uses data on inpatient visits (n = 6,218,540) in 2018, covering 9,818 principal diagnosis (PDx) codes. Each visit includes a relative weight (RW) and an adjusted relative weight (adjRW), which reflect the payment amounts under the UCS. The study calculates the average adjRW for each of 22 major PDx categories and converts these into monetary values using the NHSO standard base rate. Further details on adjRW are provided in Suphanchaimat (2017).

Table A3: Major PDx classifications

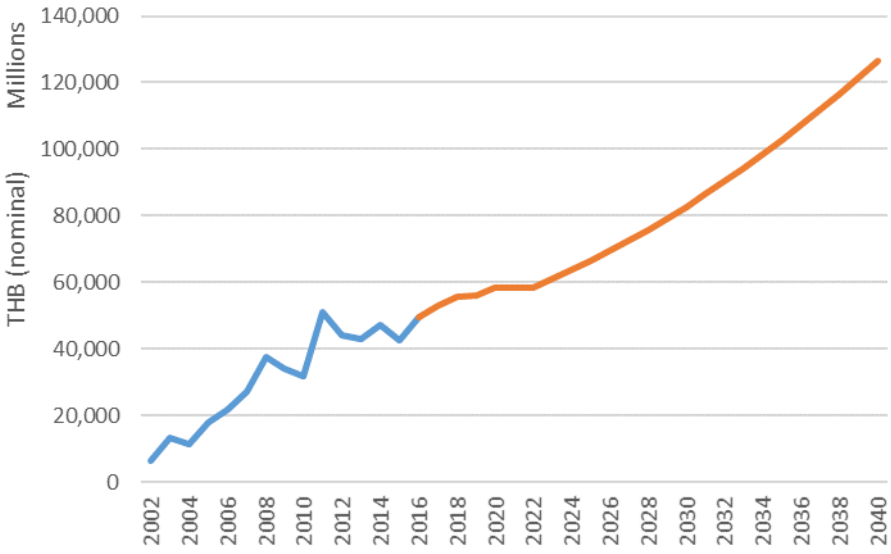
ICD-10	Type of Sub-causes	Type of Causes
A	Infectious diseases	Infectious diseases
B	Respiratory infections	Infectious diseases
C	Maternal conditions	Infectious diseases
D	Perinatal conditions	Infectious diseases
E	Nutritional disorders	Infectious diseases
F	Cancer	Non-communicable diseases
G	Benign neoplasms	Non-communicable diseases
H	Diabetes	Non-communicable diseases
I	Other endocrine and metabolic disorders	Non-communicable diseases
J	Mental disorders	Non-communicable diseases
K	Neurological disorders	Non-communicable diseases
L	Sense disorders	Non-communicable diseases
M	Cardiovascular diseases	Non-communicable diseases
N	Chronic respiratory diseases	Non-communicable diseases

ICD-10	Type of Sub-causes	Type of Causes
O	Digestive disorders	Non-communicable diseases
P	Genito-urinary diseases	Non-communicable diseases
Q	Skin diseases	Non-communicable diseases
R	Musculo-skeletal diseases	Non-communicable diseases
S	Congenital anomalies	Non-communicable diseases
T	Oral conditions	Non-communicable diseases
U	Unintentional injuries	Injuries
V	Intentional injuries	Injuries

Source: International Classification of Diseases, Tenth Revision (ICD-10)

For projections of inpatient treatment costs by disease, symptom, or cause, this study assumes a cost structure and growth rates based on the average cost structure of Ministry of Public Health (MOPH) hospitals, including regional, general, and community hospitals. Growth rate assumptions follow those used for outpatient costs, as described in the subsection on the outpatient component of UCS expenditure.

Figure A7: Projections of UC's inpatient expenditure



Other components of UCS expenditure

Two UCS expenditure components remain: (a) prevention and public health services, and (b) health administration and health insurance. This study projects both components using second-order polynomial trend regression models.

Projection for Non-UCS Expenditure

For components beyond the UCS in the National Health Accounts (NHA), this study extends projections based on the existing literature, particularly the Fiscal Policy Research Institute (FPRI) report (2018), which provides forecasts through 2036. Public health expenditure components include the Ministry of Public Health (MOPH), Civil Servant Medical Benefit Scheme (CSMBS), Social Security Scheme (SSS), and other public spending. Private expenditure components include private insurance, household spending, and other private sources.

This study applies second-order polynomial trend regression models to project MOPH, CSMBS, and SSS expenditures, building on the FPRI forecasts, which model these components in detail. In doing so, the analysis implicitly adopts the FPRI assumptions regarding population and beneficiary structures, institutional and operational cost structures, and inflation for the CSMBS and SSS schemes.

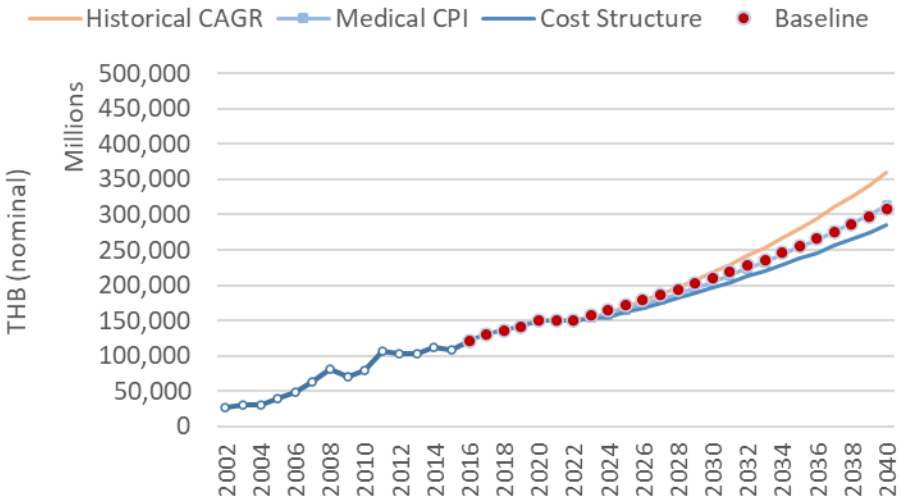
For the remaining components, the NHA provides a more disaggregated classification than the FPRI report. “Public others” in the FPRI framework corresponds to expenditures by other ministries, local governments, state-owned enterprises, independent public agencies, and the Workmen’s Compensation Fund in the NHA. Similarly, private expenditure in the NHA includes private insurance, traffic insurance, employer-provided benefits, household spending, non-profit organizations, and other private sources. These subcomponents are individually projected using trend analysis and subsequently aggregated to align with the broader FPRI categories.

UCS Simulation Scenarios

To evaluate the sustainability and adequacy of UHC financing across the four macroeconomic scenarios, this study defines UCS simulation scenarios based on the following assumptions:

1. Baseline scenario
    - The UCS projection is extended from the FPRI report.
2. Projection by cost component
    - UCS capitation has cost structure using growth rates by each of the cost structural components of the MOPH hospitals, accumulatively, at 4%
3. Historical medical CPI
    - UCS capitation increases at the same rate as the average CPI of pharmaceutical and medicine manufacturing in 2003-2018 at 5%
4. Historical CAGR
    - UCS capitation has the growth rate at the same rate of historical compound annual growth (2002-2019) at 6.4%

Figure A8: UCS budget projections



These UCS capitation scenarios are intended to inform policy discussions on the UCS budget. Further details on these scenarios are provided in the subsection on the outpatient component of UCS expenditure above.

Financial Valuation and Conversions

The main results are presented in nominal terms for ease of interpretation. Real values are derived using a fixed deflator based on the average CPI growth rate of 1.4% over 2009–2018, with 2010 as the base year (2010 = 100). While converting to constant prices affects the levels and growth rates of financial estimates, expenditure shares remain unchanged.

Thai baht values are converted into U.S. dollars using an exchange rate of 35.1 THB per USD, reflecting the historical average over 2002–2019.

MAIN RESULTS

Results are presented in both nominal and real terms. Nominal values are emphasized to avoid reliance on assumptions about deflators and to facilitate interpretation in current prices. Nevertheless, results in real terms are also provided for reference. Real values are calculated using a fixed deflator based on the average inflation rate of 1.4% over 2009–2018.

Projections beyond 2030 are included in this supplementary material for completeness; however, estimates up to 2030 are expected to be more reliable given the inherent uncertainty in long-term forecasting.

Health Expenditure Simulations

Based on baseline simulations, total health expenditure (THE) is projected to increase from USD 19 billion in 2020 to USD 26 billion in 2030 and USD 38 billion in 2040. Public health expenditure is projected to rise from USD 15 billion in 2020 to USD 19 billion in 2030 and USD 26 billion in 2040, while private health expenditure increases from USD 5 billion to USD 7 billion and USD 12 billion over the same period.

UCS expenditure is projected to increase from USD 4 billion in 2020 to USD 6 billion in 2030 and USD 9 billion in 2040. This corresponds to an average annual growth rate of 3.7% over 2021–2040, which is slower than the historical compound annual growth rate (CAGR) of 10% observed during 2002–2020.

Total health expenditure (THE) is projected to grow at a CAGR of 3.5% during 2020–2030 and 3.7% during 2030–2040, both below the historical rate of 7.3% over 2002–2020. Over 2020–2040, total public health expenditure is expected to grow at 3.2% annually, compared with 4.7% for private health expenditure.

Growth in public health expenditure is primarily driven by the “public others” component, with a CAGR of 5.5% over 2020–2040, largely reflecting spending by other ministries and local governments. In the private sector, growth is mainly driven by private insurance, suggesting an increasing role for voluntary financial protection among those able to afford it.

Table A4: BASELINE SCENARIO: Financial projections of health expenditure (USD million) – Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,360	583	305	759	406	**3,413**	168	1,529	372	**2,068**	**5,481**
2005	1,317	838	546	1,101	565	**4,367**	234	1,891	363	**2,488**	**6,855**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,630	1,895	1,248	3,072	1,917	**10,763**	973	1,797	829	**3,599**	**14,362**
2020	3,319	2,350	1,695	4,281	2,980	**14,626**	1,620	2,013	1,160	**4,793**	**19,419**
2025	3,500	2,506	1,718	4,804	3,666	**16,194**	2,045	2,197	1,385	**5,627**	**21,821**
2030	3,823	2,789	1,757	5,820	4,984	**19,174**	2,872	2,578	1,821	**7,271**	**26,445**
2035	4,177	3,104	1,797	7,051	6,520	**22,650**	3,844	3,050	2,335	**9,230**	**31,879**
2040	4,563	3,455	1,838	8,543	8,275	**26,674**	4,963	3,614	2,926	**11,503**	**38,178**

Source: Calculations using the NHA 2016 and the FPRI report as the baseline.

Table A5: CAGR SCENARIO: Financial projections of health expenditure (USD million) – Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,360	583	305	759	406	**3,413**	168	1,529	372	**2,068**	**5,481**
2005	1,317	838	546	1,101	565	**4,367**	234	1,891	363	**2,488**	**6,855**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,630	1,895	1,248	3,072	1,917	**10,763**	973	1,797	829	**3,599**	**14,362**
2020	3,319	2,350	1,695	4,294	2,980	**14,639**	1,620	2,013	1,160	**4,793**	**19,432**
2025	3,500	2,506	1,718	5,638	3,666	**17,029**	2,045	2,197	1,385	**5,627**	**22,656**
2030	3,823	2,789	1,757	7,386	4,984	**20,740**	2,872	2,578	1,821	**7,271**	**28,011**
2035	4,177	3,104	1,797	9,629	6,520	**25,227**	3,844	3,050	2,335	**9,230**	**34,457**
2040	4,563	3,455	1,838	12,479	8,275	**30,610**	4,963	3,614	2,926	**11,503**	**42,114**

Note: The compound annual growth rate (CAGR) scenario has the UCS capitation increased with its historical CAGR at 6.4%.

Table A6: MEDICAL CPI SCENARIO: Financial projections of health expenditure (USD million) – Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,360	583	305	759	406	**3,413**	168	1,529	372	**2,068**	**5,481**
2005	1,317	838	546	1,101	565	**4,367**	234	1,891	363	**2,488**	**6,855**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,630	1,895	1,248	3,072	1,917	**10,763**	973	1,797	829	**3,599**	**14,362**
2020	3,319	2,350	1,695	4,268	2,980	**14,613**	1,620	2,013	1,160	**4,793**	**19,406**
2025	3,500	2,506	1,718	5,429	3,666	**16,819**	2,045	2,197	1,385	**5,627**	**22,446**
2030	3,823	2,789	1,757	6,880	4,984	**20,233**	2,872	2,578	1,821	**7,271**	**27,504**
2035	4,177	3,104	1,797	8,668	6,520	**24,266**	3,844	3,050	2,335	**9,230**	**33,496**
2040	4,563	3,455	1,838	10,847	8,275	**28,979**	4,963	3,614	2,926	**11,503**	**40,482**

Note: The historical medical CPI scenario has the UCS capitation increased annually at the same rate as historical CPI of pharmaceutical and medicine manufacturing, averaged at 5%.

Table A7: COST STRUCTURE SCENARIO: Financial projections of health expenditure (USD million) – Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,360	583	305	759	406	**3,413**	168	1,529	372	**2,068**	**5,481**
2005	1,317	838	546	1,101	565	**4,367**	234	1,891	363	**2,488**	**6,855**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,630	1,895	1,248	3,072	1,917	**10,763**	973	1,797	829	**3,599**	**14,362**
2020	3,319	2,350	1,695	4,249	2,980	**14,594**	1,620	2,013	1,160	**4,793**	**19,387**
2025	3,500	2,506	1,718	5,288	3,666	**16,678**	2,045	2,197	1,385	**5,627**	**22,306**
2030	3,823	2,789	1,757	6,558	4,984	**19,912**	2,872	2,578	1,821	**7,271**	**27,183**
2035	4,177	3,104	1,797	8,090	6,520	**23,689**	3,844	3,050	2,335	**9,230**	**32,918**
2040	4,563	3,455	1,838	9,920	8,275	**28,051**	4,963	3,614	2,926	**11,503**	**39,555**

Note: The cost structure scenario has the UCS capitation increased at the annual growth rates by the public hospitals' cost structure component, which accumulatively averaged at 4%.

Table A8: BASELINE SCENARIO: Compound annual growth rate (CAGR) of health expenditure – Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical CAGR											
2002-2020	5.1%	8.0%	10.0%	10.1%	11.7%	**8.4%**	13.4%	1.5%	6.5%	**4.8%**	**7.3%**
Projected CAGR											
2021-2030	1.6%	1.7%	0.4%	3.1%	5.3%	**2.7%**	6.6%	2.8%	5.1%	**4.7%**	**3.5%**
2031-2040	1.8%	2.2%	0.4%	3.9%	5.1%	**3.4%**	5.5%	3.4%	4.8%	**4.7%**	**3.7%**
2021-2040	1.7%	2.0%	0.4%	3.7%	5.5%	**3.2%**	6.1%	3.1%	5.0%	**4.7%**	**3.6%**

Table A9: CAGR SCENARIO: Compound annual growth rate (CAGR) of health expenditure - Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical CAGR											
2002-2020	5.1%	8.0%	10.0%	10.1%	11.7%	**8.4%**	13.4%	1.5%	6.5%	**4.8%**	**7.3%**
Projected CAGR											
2021-2030	1.6%	1.7%	0.4%	5.6%	5.3%	**3.5%**	6.6%	2.8%	5.1%	**4.7%**	**4.0%**
2031-2040	1.8%	2.2%	0.4%	5.4%	5.1%	**4.0%**	5.5%	3.4%	4.8%	**4.7%**	**4.1%**
2021-2040	1.7%	2.0%	0.4%	5.5%	5.5%	**3.9%**	6.1%	3.1%	5.0%	**4.7%**	**4.1%**

Note: The compound annual growth rate (CAGR) scenario has the UCS capitation increased with its historical CAGR at 6.4%.

Table A10: MEDICAL CPI SCENARIO: Compound annual growth rate (CAGR) of health expenditure – Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical CAGR											
2002-2020	5.1%	8.0%	10.0%	10.1%	11.7%	**8.4%**	13.4%	1.5%	6.5%	**4.8%**	**7.3%**
Projected CAGR											
2021-2030	1.6%	1.7%	0.4%	4.9%	5.3%	**3.3%**	6.6%	2.8%	5.1%	**4.7%**	**3.8%**
2031-2040	1.8%	2.2%	0.4%	4.6%	5.1%	**3.6%**	5.5%	3.4%	4.8%	**4.7%**	**3.9%**
2021-2040	1.7%	2.0%	0.4%	4.8%	5.5%	**3.6%**	6.1%	3.1%	5.0%	**4.7%**	**3.9%**

Note: The historical medical CPI scenario has the UCS capitation increased annually at the same rate as historical CPI of pharmaceutical and medicine manufacturing, averaged at 5%.

Table A11: COST STRUCTURE SCENARIO: Compound annual growth rate (CAGR) of health expenditure – Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical CAGR											
2002-2020	5.1%	8.0%	10.0%	10.0%	11.7%	**8.4%**	13.4%	1.5%	6.5%	**4.8%**	**7.3%**
Projected CAGR											
2021-2030	1.6%	1.7%	0.4%	4.4%	5.3%	**3.2%**	6.6%	2.8%	5.1%	**4.7%**	**3.7%**
2031-2040	1.8%	2.2%	0.4%	4.2%	5.1%	**3.5%**	5.5%	3.4%	4.8%	**4.7%**	**3.8%**
2021-2040	1.7%	2.0%	0.4%	4.3%	5.5%	**3.4%**	6.1%	3.1%	5.0%	**4.7%**	**3.8%**

Note: The cost structure scenario has the UCS capitation increased at the annual growth rates by the public hospitals' cost structure component, which accumulatively averaged at 4%.

Table A12: BASELINE SCENARIO: Financial projections of health expenditure (USD million) – Real (2010=100)

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,718	737	385	959	512	**4,312**	212	1,932	470	**2,613**	**6,925**
2005	1,522	968	630	1,272	652	**5,044**	271	2,184	419	**2,873**	**7,918**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,384	1,718	1,131	2,784	1,737	**9,754**	882	1,628	751	**3,262**	**13,015**
2020	2,889	2,046	1,476	3,726	2,594	**12,731**	1,410	1,752	1,010	**4,172**	**16,902**
2025	2,837	2,032	1,393	3,894	2,972	**13,128**	1,658	1,781	1,123	**4,562**	**17,690**
2030	2,887	2,106	1,327	4,394	3,763	**14,477**	2,168	1,946	1,375	**5,490**	**19,966**
2035	2,937	2,183	1,264	4,958	4,585	**15,927**	2,703	2,145	1,642	**6,490**	**22,418**
2040	2,989	2,263	1,204	5,595	5,420	**17,470**	3,250	2,367	1,916	**7,534**	**25,004**

Source: Calculations using the NHA 2016 and the FPRI report as the baseline.

Table A13: CAGR SCENARIO: Financial projections of health expenditure (USD million) – Real (2010=100)

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,718	737	385	959	512	**4,312**	212	1,932	470	**2,613**	**6,925**
2005	1,522	968	630	1,272	652	**5,044**	271	2,184	419	**2,873**	**7,918**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,384	1,718	1,131	2,784	1,737	**9,754**	882	1,628	751	**3,262**	**13,015**
2020	2,889	2,046	1,476	3,738	2,594	**12,742**	1,410	1,752	1,010	**4,172**	**16,914**
2025	2,837	2,032	1,393	4,571	2,972	**13,805**	1,658	1,781	1,123	**4,562**	**18,367**
2030	2,887	2,106	1,327	5,577	3,763	**15,659**	2,168	1,946	1,375	**5,490**	**21,149**
2035	2,937	2,183	1,264	6,771	4,585	**17,740**	2,703	2,145	1,642	**6,490**	**24,230**
2040	2,989	2,263	1,204	8,173	5,420	**20,048**	3,250	2,367	1,916	**7,534**	**27,582**

Note: The compound annual growth rate (CAGR) scenario has the UCS capitation increased with its historical CAGR at 6.4%.

Table A14: MEDICAL CPI SCENARIO: Financial projections of health expenditure (USD million) – Real (2010=100)

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,718	737	385	959	512	**4,312**	212	1,932	470	**2,613**	**6,925**
2005	1,522	968	630	1,272	652	**5,044**	271	2,184	419	**2,873**	**7,918**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,384	1,718	1,131	2,784	1,737	**9,754**	882	1,628	751	**3,262**	**13,015**
2020	2,889	2,046	1,476	3,715	2,594	**12,719**	1,410	1,752	1,010	**4,172**	**16,891**
2025	2,837	2,032	1,393	4,401	2,972	**13,635**	1,658	1,781	1,123	**4,562**	**18,197**
2030	2,887	2,106	1,327	5,194	3,763	**15,277**	2,168	1,946	1,375	**5,490**	**20,766**
2035	2,937	2,183	1,264	6,095	4,585	**17,064**	2,703	2,145	1,642	**6,490**	**23,554**
2040	2,989	2,263	1,204	7,104	5,420	**18,979**	3,250	2,367	1,916	**7,534**	**26,513**

Note: The historical medical CPI scenario has the UCS capitation increased annually at the same rate as historical CPI of pharmaceutical and medicine manufacturing, averaged at 5%.

Table A15: COST STRUCTURE SCENARIO: Financial projections of health expenditure (USD million) – Real (2010=100)

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
2002	1,718	737	385	959	512	**4,312**	212	1,932	470	**2,613**	**6,925**
2005	1,522	968	630	1,272	652	**5,044**	271	2,184	419	**2,873**	**7,918**
2010	1,868	1,773	824	2,246	990	**7,701**	619	1,513	605	**2,738**	**10,439**
2015	2,384	1,718	1,131	2,784	1,737	**9,754**	882	1,628	751	**3,262**	**13,015**
2020	2,889	2,046	1,476	3,699	2,594	**12,703**	1,410	1,752	1,010	**4,172**	**16,875**
2025	2,837	2,032	1,393	4,287	2,972	**13,521**	1,658	1,781	1,123	**4,562**	**18,083**
2030	2,887	2,106	1,327	4,951	3,763	**15,034**	2,168	1,946	1,375	**5,490**	**20,524**
2035	2,937	2,183	1,264	5,689	4,585	**16,658**	2,703	2,145	1,642	**6,490**	**23,148**
2040	2,989	2,263	1,204	6,497	5,420	**18,372**	3,250	2,367	1,916	**7,534**	**25,906**

Note: The cost structure scenario has the UCS capitation increased at the annual growth rates by the public hospitals' cost structure component, which accumulatively averaged at 4%.

Table A16: BASELINE SCENARIO: Compound annual growth rate (CAGR) of health expenditure – Real (2010=100)

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical CAGR											
2002-2020	2.9%	5.8%	7.8%	7.8%	9.4%	**6.2%**	11.1%	-0.5%	4.3%	**2.6%**	**5.1%**
Projected CAGR											
2021-2030	0.2%	0.3%	-1.1%	1.7%	3.8%	**1.3%**	5.1%	1.3%	3.7%	**3.3%**	**2.0%**
2031-2040	0.3%	0.7%	-1.0%	2.4%	3.6%	**1.9%**	4.1%	2.0%	3.3%	**3.2%**	**2.3%**
2021-2040	0.3%	0.6%	-1.0%	2.2%	4.0%	**1.8%**	4.6%	1.7%	3.5%	**3.2%**	**2.2%**

Table A17: CAGR SCENARIO: Compound annual growth rate (CAGR) of health expenditure – Real (2010=100)

	Public						Private				TOTAL
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	
Historical CAGR											
2002-2020	2.9%	5.8%	7.8%	7.9%	9.4%	**6.2%**	11.1%	-0.5%	4.3%	**2.6%**	**5.1%**
Projected CAGR											
2021-2030	0.2%	0.3%	-1.1%	4.1%	3.8%	**2.1%**	5.1%	1.3%	3.7%	**3.3%**	**2.5%**
2031-2040	0.3%	0.7%	-1.0%	3.9%	3.6%	**2.5%**	4.1%	2.0%	3.3%	**3.2%**	**2.7%**
2021-2040	0.3%	0.6%	-1.0%	4.0%	4.0%	**2.4%**	4.6%	1.7%	3.5%	**3.2%**	**2.6%**

Note: The compound annual growth rate (CAGR) scenario has the UCS capitation increased with its historical CAGR at 6.4%.

Table A18: MEDICAL CPI SCENARIO: Compound annual growth rate (CAGR) of health expenditure – Real (2010=100)

	Public						Private				TOTAL
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	
Historical CAGR											
2002-2020	2.9%	5.8%	7.8%	7.8%	9.4%	**6.2%**	11.1%	-0.5%	4.3%	**2.6%**	**5.1%**
Projected CAGR											
2021-2030	0.2%	0.3%	-1.1%	3.4%	3.8%	**1.8%**	5.1%	1.3%	3.7%	**3.3%**	**2.4%**
2031-2040	0.3%	0.7%	-1.0%	3.2%	3.6%	**2.2%**	4.1%	2.0%	3.3%	**3.2%**	**2.5%**
2021-2040	0.3%	0.6%	-1.0%	3.3%	4.0%	**2.1%**	4.6%	1.7%	3.5%	**3.2%**	**2.4%**

Note: The historical medical CPI scenario has the UCS capitation increased annually at the same rate as historical CPI of pharmaceutical and medicine manufacturing, averaged at 5%.

Table A19: COST STRUCTURE SCENARIO: Compound annual growth rate (CAGR) of health expenditure – Real (2010=100)

	Public						Private				TOTAL
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	
Historical CAGR											
2002-2020	2.9%	5.8%	7.8%	7.8%	9.4%	**6.2%**	11.1%	-0.5%	4.3%	**2.6%**	**5.1%**
Projected CAGR											
2021-2030	0.2%	0.3%	-1.1%	3.0%	3.8%	**1.7%**	5.1%	1.3%	3.7%	**3.3%**	**2.2%**
2031-2040	0.3%	0.7%	-1.0%	2.7%	3.6%	**2.0%**	4.1%	2.0%	3.3%	**3.2%**	**2.3%**
2021-2040	0.3%	0.6%	-1.0%	2.8%	4.0%	**2.0%**	4.6%	1.7%	3.5%	**3.2%**	**2.3%**

Note: The cost structure scenario has the UCS capitation increased at the annual growth rates by the public hospitals' cost structure component, which accumulatively averaged at 4%.

Table A20: BASELINE SCENARIO: Share of health expenditure – Real (2010=100) and Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical Share											
2002-2015	19%	14%	8%	20%	10%	**72%**	5%	18%	6%	**28%**	**100%**
2007-2015	18%	15%	8%	23%	11%	**75%**	5%	14%	6%	**25%**	**100%**
Projected Share											
2011-2020	18%	13%	8%	23%	13%	**76%**	7%	12%	6%	**24%**	**100%**
2021-2030	16%	11%	8%	22%	17%	**74%**	10%	10%	6%	**26%**	**100%**
2031-2040	13%	10%	6%	22%	21%	**71%**	12%	10%	7%	**29%**	**100%**
2021-2040	14%	11%	7%	22%	19%	**72%**	11%	10%	7%	**28%**	**100%**

Table A21: CAGR SCENARIO: Share of health expenditure – Real (2010=100) and Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical Share											
2002-2015	19%	14%	8%	20%	10%	**72%**	5%	18%	6%	**28%**	**100%**
2007-2015	18%	15%	8%	23%	11%	**75%**	5%	14%	6%	**25%**	**100%**
Projected Share											
2011-2020	18%	13%	8%	23%	13%	**76%**	7%	12%	6%	**24%**	**100%**
2021-2030	15%	11%	7%	25%	16%	**75%**	9%	10%	6%	**25%**	**100%**
2031-2040	12%	9%	5%	28%	19%	**73%**	11%	9%	7%	**27%**	**100%**
2021-2040	14%	10%	6%	27%	18%	**74%**	10%	9%	6%	**26%**	**100%**

Note: The compound annual growth rate (CAGR) scenario has the UCS capitation increased with its historical CAGR at 6.4%.

Table A22: MEDICAL CPI SCENARIO: Share of health expenditure – Real (2010=100) and Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical Share											
2002-2015	19%	14%	8%	20%	10%	**72%**	5%	18%	6%	**28%**	**100%**
2007-2015	18%	15%	8%	23%	11%	**75%**	5%	14%	6%	**25%**	**100%**
Projected Share											
2011-2020	18%	13%	8%	23%	13%	**76%**	7%	12%	6%	**24%**	**100%**
2021-2030	15%	11%	8%	24%	17%	**75%**	9%	10%	6%	**25%**	**100%**
2031-2040	12%	9%	5%	26%	20%	**72%**	12%	9%	7%	**28%**	**100%**
2021-2040	14%	10%	6%	25%	18%	**74%**	10%	9%	7%	**26%**	**100%**

Note: The historical medical CPI scenario has the UCS capitation increased annually at the same rate as historical CPI of pharmaceutical and medicine manufacturing, averaged at 5%.

Table A23: COST STRUCTURE SCENARIO: Share of health expenditure – Real (2010=100) and Nominal

	Public						Private				
	MOPH	CSMBS	SSS	UC	Public Others	**Total**	Private Insurance	Household	Private Others	**Total**	**TOTAL**
Historical Share											
2002-2015	19%	14%	8%	20%	10%	**72%**	5%	18%	6%	**28%**	**100%**
2007-2015	18%	15%	8%	23%	11%	**75%**	5%	14%	6%	**25%**	**100%**
Projected Share											
2011-2020	18%	13%	8%	23%	13%	**76%**	7%	12%	6%	**24%**	**100%**
2021-2030	16%	11%	8%	24%	17%	**75%**	9%	10%	6%	**25%**	**100%**
2031-2040	13%	9%	5%	25%	20%	**72%**	12%	9%	7%	**28%**	**100%**
2021-2040	14%	10%	6%	24%	18%	**73%**	11%	10%	7%	**27%**	**100%**

Note: The cost structure scenario has the UCS capitation increased at the annual growth rates by the public hospitals' cost structure component, which accumulatively averaged at 4%.

Evaluation for the SAFE Goals

This study uses national indicators and targets from the SAFE framework (Committee on Resource Mobilization for Sustainable Universal Health Coverage, 2016) as benchmarks to assess the sustainability and adequacy of total health expenditure under alternative UCS expenditure scenarios.

Figure A9: Indicator and Target (as of 2022)

Sustainability	
1	Total health expenditure (THE) ≤ 5% of GDP
2	General Government Health Expenditure (GGHE) ≤ 20% of General Government Expenditure (GGE)
Adequacy	
3	Total health expenditure (THE) ≥ 4.6 % of GDP
4	General Government Health Expenditure (GGHE) ≥ 17% of General Government Expenditure (GGE)
5	Non-government health expenditure (NGHE) ≤ 20% of Total Health Expenditure (THE)

Source: Committee on Resource Mobilization for Sustainable UHC (2016)

This study considers four macroeconomic scenarios based on different assumptions about economic growth and inflation. UCS expenditure is modeled under four alternative scenarios: (1) a baseline based on the FPRI report, (2) growth based on the historical compound annual growth rate of UCS capitation, (3) growth aligned with the historical CPI for the medical and pharmaceutical sector, and (4) projections based on CPI by cost component.

Under moderate macroeconomic scenarios, total health expenditure (THE) as a share of GDP is projected to reach 5.2–5.5% in 2030 and 6.7–7.4% in 2040, exceeding the SAFE benchmark of 5% of GDP set for 2022.

Table A24: Total Health Expenditure (THE) to GDP Ratio

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2020	4.3%	4.4%	4.4%	4.4%
	2030	5.0%	5.3%	5.5%	5.8%
	2040	5.9%	6.7%	7.1%	8.0%
Projection by cost component	2020	4.3%	4.4%	4.4%	4.4%
	2030	4.9%	5.2%	5.4%	5.8%
	2040	5.9%	6.7%	7.0%	7.9%
Historical medical CPI	2020	4.3%	4.4%	4.4%	4.4%
	2030	5.0%	5.3%	5.5%	5.8%
	2040	6.0%	6.8%	7.2%	8.1%
Historical CAGR	2020	4.3%	4.4%	4.4%	4.4%
	2030	5.0%	5.4%	5.5%	5.9%
	2040	6.2%	7.0%	7.4%	8.4%

General Government Health Expenditure (GGHE) as a share of General Government Expenditure (GGE) is projected to reach 21–22% in 2030 and 22–25% in 2040, exceeding the SAFE target of 20% of GGE set for 2020. It should be noted that the GDP scenarios in this study are relatively conservative with respect to future economic growth. However, even under a higher assumed annual GDP growth rate of 5%, the overall conclusion remains unchanged.

These findings suggest that the health sector will continue to face challenges in budget prioritization, competing with other public spending needs such as education, infrastructure investment, social protection, and national security.

Table A25: General Government Health Expenditure (GGHE) to General Government Expenditure (GGE) Ratio

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2020	19.7%	19.9%	20.0%	20.2%
	2030	19.9%	21.2%	21.9%	23.4%
	2040	20.1%	22.7%	23.9%	27.0%
Projection by cost component	2020	19.6%	19.9%	20.0%	20.2%
	2030	19.6%	21.0%	21.6%	23.1%
	2040	19.8%	22.3%	23.6%	26.6%
Historical medical CPI	2020	19.7%	19.9%	20.0%	20.2%
	2030	19.9%	21.2%	21.9%	23.4%
	2040	20.3%	23.0%	24.3%	27.4%
Historical CAGR	2020	19.7%	19.9%	20.0%	20.2%
	2030	20.3%	21.7%	22.3%	23.8%
	2040	21.3%	24.1%	25.5%	28.8%

Non-government health expenditure (NGHE) as a share of total health expenditure (THE) is projected to reach 27% in 2030 and 30% in 2040. However, excluding private insurance, the NGHE share declines to 17% in 2030 and 16% in 2040. This reflects the fact that private health insurance is the primary driver of NGHE growth.

Table A26: Non-government Health Expenditure (NGHE) to Total Health Expenditure (THE) Ratio

UC expenditure growth		All Private Expenditure Components	Excluding Private Insurance
Baseline	2020	24%	16%
	2030	27%	17%
	2040	30%	17%
Projection by cost component	2020	24%	16%
	2030	28%	17%
	2040	30%	17%
Historical medical CPI	2020	24%	16%
	2030	27%	17%
	2040	30%	17%
Historical CAGR	2020	24%	16%
	2030	27%	16%
	2040	29%	16%

Therefore, ensuring sufficient and sustainable fiscal space for UHC in Thailand remains challenging, particularly under scenarios of slower economic growth.

Required Public Budget: THE ≤ 5% of GDP

One of the SAFE sustainability targets specifies that total health expenditure (THE) should not exceed 5% of GDP. This study identifies projected levels of THE that exceed this threshold and multiplies the excess by the shares of General Government Health Expenditure (GGHE) and UCS expenditure in a given year. This approach provides an estimate of the additional public budget required when projected spending surpasses the SAFE benchmark.

Table A27: Excess of Total Health Expenditure (THE) from 5% of GDP

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2030	-0.05%	0.3%	0.5%	0.8%
	2040	0.9%	1.7%	2.1%	3.0%
Projection by cost component	2030	-0.09%	0.2%	0.4%	0.8%
	2040	0.9%	1.7%	2.0%	2.9%
Historical medical CPI	2030	0.0%	0.3%	0.5%	0.8%
	2040	1.0%	1.8%	2.2%	3.1%
Historical CAGR	2030	0.0%	0.4%	0.5%	0.9%
	2040	1.2%	2.0%	2.4%	3.4%

Note: Percentage of GDP that exceeds the threshold at 5% of GDP.

Using the GGHE share applied to the excess THE above the 5% of GDP threshold, the additional budget required for GGHE is estimated at approximately USD 1–1.9 billion in 2030 and USD 6–9 billion in 2040 under moderate scenarios.

Table A28: Additional Required Government Health Expenditure (GGHE) from THE exceeding 5% of GDP (in million USD)

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2030	0	1,073	1,592	2,729
	2040	4,245	6,831	7,862	10,031
Projection by cost component	2030	0	900	1,417	2,550
	2040	3,959	6,534	7,560	9,720
Historical medical CPI	2030	0	1,078	1,597	2,734
	2040	4,537	7,135	8,170	10,349

Historical CAGR	2030	97	1,355	1,877	3,019
	2040	5,551	8,185	9,235	11,445

Note: Evaluate from the excess of THE at 5% of GDP and multiply with the share of GGHE from THE.

Applying the UCS share within GGHE, the additional UCS budget required is estimated at approximately USD 0.4–0.8 billion in 2030 and USD 3–5 billion in 2040.

Table A29: Additional Required UCS Expenditure for THE exceeding 5% of GDP (in million USD)

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2030	0	449	666	1,142
	2040	1,946	3,131	3,604	4,598
Projection by cost component	2030	0	367	579	1,041
	2040	1,766	2,915	3,373	4,336
Historical medical CPI	2030	0	452	669	1,145
	2040	2,134	3,356	3,843	4,868
Historical CAGR	2030	42	589	816	1,313
	2040	2,820	4,158	4,691	5,814

Note: Evaluate from the excess of GGHE at 20% of GGE and multiply with the share of UCS from GGHE

When considering the additional budget required to bridge the gap between projected expenditure and the 5% of GDP target, the required amount is relatively modest.

Required Public Budget: GGHE ≤ 20% of GGE

Another SAFE sustainability target requires that General Government Health Expenditure (GGHE) does not exceed 20% of General Government Expenditure (GGE). Accordingly, this study assesses the extent to which projected GGHE exceeds this threshold and estimates the additional budget required.

Table A30: Excess of General Government Health Expenditure (GGHE) from 20% of General Government Expenditure (GGE)

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2030	0%	1%	2%	3%
	2040	0%	3%	4%	7%
Projection by cost component	2030	0%	1%	2%	3%
	2040	0%	2%	4%	7%
Historical medical CPI	2030	0%	1%	2%	3%
	2040	0%	3%	4%	7%
Historical CAGR	2030	0%	2%	2%	4%
	2040	1%	4%	5%	9%

Note: Percentage of GGHE that exceeds the threshold at 20% of GGE.

The additional budget required for GGHE is estimated at approximately USD 1–2 billion in 2030 and USD 7–9.3 billion in 2040 under moderate scenarios.

Table A31: Additional Required GGHE from GGHE exceeding 20% of GGE (in million USD)

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2030	0	1,190	1,795	3,254
	2040	71	3,548	5,199	9,345
Projection by cost component	2030	0	879	1,397	2,531
	2040	0	2,755	3,977	6,550
Historical medical CPI	2030	0	1,121	1,638	2,772
	2040	462	3,529	4,751	7,324
Historical CAGR	2030	244	1,595	2,212	3,700
	2040	1,795	5,497	7,255	11,668

Note: Evaluate from the excess of THE at 5% of GDP and multiply with the share of GGHE from THE.

The additional GGHE requirement is then allocated to the UCS based on its share of GGHE in a given year to estimate the corresponding increase in the UCS budget. The additional UCS budget required is approximately USD 0.3–0.7 billion in 2030 and USD 0.9–2.6 billion in 2040.

Table A32: Additional Required UCS expenditure for GGHE exceeding 20% of GGE (in million USD)

		GDP scenarios			
UC expenditure growth		Growth 3.3% & Inflation 1.4%	Growth 3.3% & Inflation 2%	Growth 2.5% & Inflation 1.4%	Growth 2.5% & Inflation 2%
Baseline	2030	0	361	545	988
	2040	23	1,136	1,665	2,993
Projection by cost component	2030	0	259	412	747
	2040	0	855	1,234	2,033
Historical medical CPI	2030	0	340	498	842
	2040	152	1,165	1,568	2,418
Historical CAGR	2030	77	506	701	1,173
	2040	649	1,987	2,623	4,218

Note: Evaluate from the excess of GGHE at 20% of GGE and multiply with the share of UCS from GGHE.

Potential Sources of UHC Financing

This study considers three types of potential revenue sources to mobilize additional funds for expanding and sustaining UHC financing

(a) Earmarked taxes: This study considers potential revenue sources from earmarked taxes, based on the core principle of taxing activities or behaviors that are harmful to population health and that consequently impose a burden on health systems through disease and injury. The author proposes several earmarked tax options as complementary financing sources for the UCS, the main UHC scheme that provides universal protection covering more than 90% of children, more than 80% of older persons, and all unemployed and informal workers. Possible revenue options include taxes on sugar-sweetened beverages, high-sodium foods, tobacco, and alcoholic beverages; penalty revenues from driving under the influence and speeding violations; and environmental emission taxes.

Table A33: Revenue sources and assumptions for earmarked taxes

	Possible Revenue Sources	Assumptions and Rationale
1	Tax revenue from SSB	Around 2020, Thailand collected approximately THB 2 billion in sugar-sweetened beverage (SSB) tax revenue, with an estimated additional THB 1.5 billion expected in the next fiscal year. This study assumes that half of the SSB tax revenue is allocated to support the UCS budget.
2	Tax revenue from sodium content of food	This study assumes that at least THB 1 billion could be collected from a sodium tax, with half of the revenue allocated to the UCS budget.
3	Tax revenue from tobacco	This study projects revenue based on the annual growth of tobacco tax revenue and proposes that future incremental increases in tobacco tax collections be allocated to support the UCS system.

	Possible Revenue Sources	Assumptions and Rationale
4	Tax revenue from alcoholic beverages	Same as the tobacco tax.
5	Penalty revenue from DUI	This study uses an estimated 14,000 accidents caused by driving under the influence, based on incidents occurring during the New Year and Songkran festivals. The penalty fee is assumed to be THB 10,000 per case.
6	Penalty revenue from speed driving	This study uses an estimated 12,000 road accidents attributable to speeding. The current penalty fee of THB 1,000 is considered too low. Accordingly, this study assumes an increased penalty of THB 10,000 per violation.
7	Contribution by donors	Five percent of household expenditure is assumed to be allocated to donations and contributions. Philanthropic expenditure accounts for 1.9% of total consumption, according to the SES 2011–2018. Household consumption expenditure is based on GDP data from the NESDC.
8	Pollution tax such as PM2.5 emission	This study assumes the enforcement of taxation under the polluter-pays principle, and that pollution tax revenues allocated to the health system amount to approximately THB 5 billion.

Note: The conversion to THB is 1 USD/35.1 THB, an average between 2002 and 2019.

The aggregate of all prospective revenue sources for the UCS is estimated at approximately USD 700 million in the coming years. If Thailand is able to mobilize this amount, it would be sufficient to offset the additional UCS budget required in 2030, when Total Health Expenditure (THE) is projected to exceed 5% of GDP, as discussed above.

However, there is increasing pressure to mobilize this estimated potential revenue by 2030 to compensate for projections that General Government Health Expenditure (GGHE) will exceed

20% of General Government Expenditure (GGE). Under the baseline scenario, this gap is projected to be approximately USD 1–2 million in 2030.

Table A34: Estimated revenue for earmarked taxes

Unit: USD million per year

	Possible Revenue Sources	Actual	Target	Assumed
1	Tax revenue from SSB	50		
2	Tax revenue from sodium food			14
3	Tax revenue from tobacco		85	
4	Tax revenue from alcoholic beverages		171	
5	Penalty fee on driving under the influence		4	
6	Penalty fee on speed ticket		3	
7	Contribution by donors		251	
8	Pollution tax such as PM2.5 emission			142
	Total	50	515	157
	Grand Total			722

Note: The conversion to THB is 1 USD/35.1 THB, an average between 2002 and 2019.

(b) VAT increase: VAT increases are technically less complex than other revenue options, given the existing tax structure, and can generate an immediate and substantial increase in public revenue. For example, a one-percentage-point increase in VAT, raising the rate to 8%, could generate approximately USD 3.5–4 billion in additional revenue. The current VAT rate is 7%, with an estimated policy capacity to increase it up to 10%. However, Pitidol (2018) notes that VAT is not a progressive tax, as it imposes a higher burden on the poor relative to their income compared to the rich. Therefore, if VAT is used as a revenue-raising instrument, the government should ensure that it is accompanied by adequate social welfare measures to guarantee net benefits for lower-income groups, thereby helping to mitigate inequality in Thailand.

The Thailand Development Research Institute (2018) proposed an earmarked VAT approach, in which additional government revenue from a VAT increase is prioritized for health spending, particularly for low-income populations. For example, each one-percentage-point increase in the VAT rate could generate approximately USD 2,300 million in revenue, a portion of which could be explicitly allocated to the health budget.

(c) Tax reform: As Thailand is among the countries with the highest wealth inequality, tax reform aimed at redistribution could be highly effective in reallocating resources, reducing inequality, improving macroeconomic growth prospects, and mitigating risks of political instability. A key feature of Thailand's inequality is the concentration of wealth among the "top one percent," which holds nearly 60 percent of the country's total wealth. Therefore, a tax system that promotes redistribution from the wealthiest groups to the broader population would benefit the majority of Thais (Pitidol, 2018).

However, over the past decades, several progressive tax policies—such as inheritance tax, land and building tax, and capital gains tax—have remained unfinished agendas or have had limited effectiveness in addressing inequality. A key reason for their limited impact, as discussed in Pitidol (2018), is that existing implementations include exemptions and loopholes that enable high-income groups to avoid taxation.

The Thailand Development Research Institute (2018) evaluated taxation policies aimed at reducing inequality and promoting wealth redistribution toward a more equitable society. Considering several potential tax reform options, the study found that the government could generate at least USD 1.6–1.9 billion in additional public revenue.

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