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The Future of Health Expenditure in ASEAN Countries: A Forecasting Analysis with ARIMA

Alexsandra Putri Sekar Melati[1], Estro Dariatno Sihaloho[2*]
[1,2]Department of Economics, Faculty of Economics and Business, Universitas Padjadjaran, Indonesia
E-mail: [1]alexsandra22001@mail.unpad.ac.id, [2]estro.sihaloho@unpad.ac.id
[*]**Corresponding author**

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ABSTRACT

Research Originality: The primary contribution of this research is its novel analysis and forecasting of health expenditure in the ASEAN region, which has been previously underexamined by scholars.

Research Objectives: This research forecasts per capita health expenditure across three ASEAN countries, broken down by government, private, and out-of-pocket sources.

Research Methods: This study employs a time series ARIMA model approach using secondary data from the World Bank for the period 2000 to 2021.

Empirical Results: The findings indicate that projections for all three countries significantly increase across all health expenditure categories. Singapore is expected to see a sharp surge in all health expenditure components. At the same time, Indonesia is forecasted to achieve the highest growth rate in percentage terms, but lags in nominal terms. Conversely, Malaysia is projected to experience moderate growth in health expenditure.

Implications: This research underscores the financing disparities and the urgent need for health system reform.

Keywords:
health expenditure; forecasting models; health system; ARIMA

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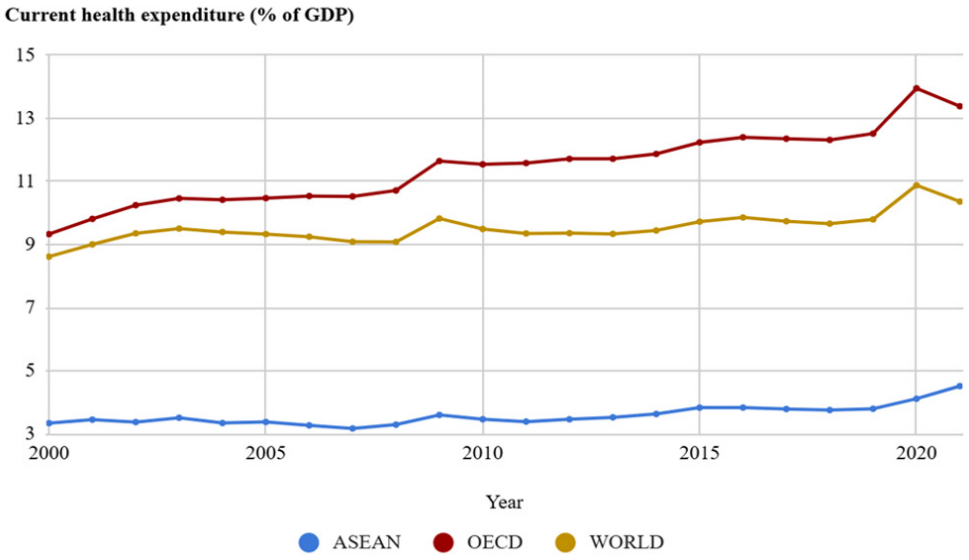
INTRODUCTION

One of the pillars of a country's development is the health sector, where strengthening the health system contributes to economic growth by creating new jobs, increasing productivity, and developing basic service infrastructure. (Stenberg et al., 2017). Based on data from the Institute for Health Metrics and Evaluation, total global health expenditure in 2017 reached USD 7.9 trillion and is projected to increase to USD 11.0 trillion in 2030 (IHME, 2020). In Southeast Asia alone, data from the World Health Organization reported that total health expenditure in ASEAN countries reached USD 49.7 billion in 2017 (GHED WHO, 2018). This number represents a 42% increase compared to the previous five years. Despite the increase in spending in the health sector, the percentage.

Figure 1. Current Health Expenditure (% of GDP)



Source: World Bank, Processed

The allocation of GDP to the health sector in ASEAN countries remains lower than the OECD average and global total healthcare spending. The lack of funding allocation results in dire consequences, such as low life expectancy and high infant and toddler mortality rates (Rahman et al., 2018). On the other hand, government spending on the health sector tends to have a greater impact on health improvements in Southeast Asia. In contrast, private-sector health expenditures show only positive effects in countries with high levels of prosperity, such as Brunei and Singapore (Singh et al., 2022). Nevertheless, trends in public health spending across ASEAN countries vary: some show improvement, while others remain lagging (Li et al., 2021). This inequality is exacerbated by other problems, namely the still significant gap in financial protection and access to health services, especially among vulnerable populations, and the high out-of-pocket costs, which increase the risk burden for the group (Myint et al., 2019).

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ASEAN countries such as Indonesia, Singapore, and Malaysia face increasingly complex health challenges due to population growth, demographic changes, and the increasing prevalence of non-communicable diseases (NCDs). In Indonesia, stroke and heart disease are the diseases that cause the highest mortality rates, contributing to 141 and 90 out of 100,000 population, respectively (WHO, 2022). Other health challenges facing Indonesia include low life expectancy, high maternal and infant mortality rates, and limited access to health services for children (Agustina et al., 2019; Fahdhienie et al., 2024; BPS, 2023). On the other hand, Singapore is facing a surge in NCDs along with an aging population and unhealthy lifestyles, which are driving a significant increase in the prevalence of obesity and type 2 diabetes (Phan et al., 2014; Department of Statistics, 2024). Meanwhile, Malaysia had the highest obesity rate in Southeast Asia in 2016, and faces challenges related to unequal access to health, especially for migrant groups (Loganathan et al., 2019; Central Intelligence Agency, 2017). Given these challenges, projections of healthcare funding allocations to maintain sustainability are important for countries' long-term planning and development, as they provide insight into future trends in health needs. These projections enable governments and stakeholders to identify funding gaps, formulate policies that respond to demographic and epidemiological changes, and allocate resources more efficiently.

The aforementioned projections can take the form of program planning, enabling the smooth, structured implementation of healthcare projects. Furthermore, projected expenditure can be an important indicator in the readiness of the health system in a country, some studies show that an increase in health expenditure can reflect a commitment to good health services, such as a study (Martínez et al., 2021) conducted in Spain an increase in health budgets can directly improve patient satisfaction and the perception of quality of service, mainly if it is focused on primary care and diagnostic tools and studies In Australia, public health expenditure that increased by 1% was associated with a 2.2% decrease in the number of Years of Life Lost (YLL), especially in areas with poor health outcomes (Edney et al., 2018). However, another view is that the increase in health expenditure needs to be balanced with efficiency, because without proper management, the increase in the budget may not achieve the expected health outcomes (Garcia-Escribano et al., 2022).

A major problem in the field of research on health expenditure projections is that it is still dominated by focusing on countries with large economies. One of the studies with the same focus is the research conducted by Jakovljevic et al. (2022), which projects BRICS countries' health spending through 2030, with an emphasis on government spending, prepaid, and direct financing by individuals (out-of-pocket). The study is supported by findings (Sahoo et al., 2023) on health expenditure, with an emphasis on public financing and out-of-pocket costs to achieve Universal Health Coverage (UHC) in BRICS countries by 2035. Further discussed in the findings (J. Wang et al., 2024), the prediction of health expenditure and the long-term trend in America are examined using the Support Vector Regression (SVR) method, with the results highlighting the urgent need for effective

policies to address the rising health expenditure. Another study by Luo et al. (2024) examines Total Health Expenditure (THE) in China using the System Dynamics (SD) approach and shows an increasing trend in health expenditure until 2060. It discusses the urgency of improving the efficiency of total health expenditure to address the challenges of population aging and decline.

The novelty of this study lies in a comparative analysis of projected health expenditures across the three ASEAN countries, a topic that remains underexplored in regional empirical research. The absence of studies projecting health expenditure in ASEAN countries is a gap that can be updated. Thus, this study aims to analyze the health policy implications of projected health spending in 3 ASEAN countries —Indonesia, Singapore, and Malaysia — until 2035.

METHODS

This study aims to analyze the health expenditure of three Southeast Asian countries: Indonesia, Singapore, and Malaysia. The data are sourced from the World Development Indicators (World Bank, 2025), which are all expressed in current international dollars and adjusted for purchasing power parity (PPP). The data are based on the System of Health Accounts 2011 (SHA 2011) classification framework, developed by the OECD, WHO, and Eurostat, which provides an overview of financial flows related to the consumption of health goods and services. The data in the study, sourced from the World Bank, is only available through 2021. Therefore, this study is inherently limited by the availability of such data.

Table 1. Operational Variables

Variables	Definitions	Period	Sources	Code
Current health expenditure per capita, PPP (current international $)	All expenditures on health goods and services from all sources of financing	2000-2021	World Bank – WDI	*hecap*
Domestic general government health expenditure per capita, PPP (current international $)	Health expenditure by domestic governments per capita, where all funding comes from the government, including insurance and transfers, but does not include health assistance from abroad	2000-2021	World Bank – WDI	*ghecap*
Domestic private health expenditure per capita, PPP (current international $)	Health expenditure from non-government sources, such as the community and per capita insurance	2000-2021	World Bank – WDI	*phecap*
Domestic private health expenditure per capita, PPP (current international $)	Direct health expenditure by individuals, without third-party financing such as per capita insurance.	2000-2021	World Bank – WDI	ofpcap

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ARIMA is a commonly used method for predicting and analyzing data compiled in a time series. This analysis uses an approach with three main elements, namely Auto Regressive (AR), differentiating (d), and Moving Average (MA), and all are represented (p,d,q) (Bandyopadhyay, 2016).

Auto-Regressive (AR) is a linear statistical model used to predict a variable based on the lag values of that variable. In this model, the y_t following the AR process, the values y_t are influenced by the y in the past, (Choudhary et al., 2022) shown in Equation 1:

$$y_t = \delta + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \ldots + \phi_p y_{t-p} + \epsilon_t \quad (1)$$

The model includes a component of the (δ), a set of lag variables from y_t (y_{t-i}) that depicts dependency y_t to the previous value, the autoregressive parameter (ϕ_{t-i}), and the error component (ϵ_t). If the model includes lag up to an order of p, then the autoregressive process is referred to as AR order of p.

The Moving Average (MA) model is one of the linear model approaches, where the analyzed variables are formed based on a combination of error terms in the current period and the previous period. This model represents the relationship between the current value and random fluctuations that occur over a period of time, shown in Equation 2:

$$y_t = \delta + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + \cdots + \theta_q \epsilon_{t-q} + \epsilon_t \quad (2)$$

The model includes components θ, which plays a role in associating the current value with several prediction errors from previous periods. The error comes from the autoregressive model in the previous period. When the model accounts for errors up to lag q, then the model is categorized as a model with order q.

This study utilizes R Studio software, utilizing the auto. The ARIMA function with a prediction interval set at a 95% confidence level, the auto arima function automatically determines the best order combination (p,d,q) based on the determination of root units, minimization of the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) (Zhang et al., 2023), as well as the maximum likelihood (MLE) estimate to obtain the most optimal ARIMA model (Wong et al., 2021).

The root of the root unit test is conducted to ensure the stationarity of the data, with the results serving as the basis for determining whether differentiating processes are necessary to form an optimal ARIMA model. Meanwhile, AIC and BIC testing are performed to compare various models. The difference is that AIC uses a linear penalty on the number of parameters. At the same time, BIC gives a logarithmic penalty on the sample size, making it more conservative for complex models. In the diagnostic test, white noise testing is carried out. The test was conducted using the Ljung-Box test statistics to verify the absence of autocorrelation in the residuals, thereby confirming that the model effectively captured the data structure (Pei et al., 2024). If the p-value is more than 0.05, it can be said to meet the assumption of White Noise.

RESULTS AND DISCUSSION

The section presents the projected health expenditure for Indonesia, Singapore, and Malaysia. The findings show an increase in health expenditure across all components in all three countries. Singapore is projected to experience increases across all health expenditure components. In contrast, Indonesia is projected to have the highest growth rate, albeit with a nominal figure that is significantly lower than Singapore's. The third country involved in this research, Malaysia, is expected to experience more moderate growth than the other two countries.

Table 2. Descriptive Statistics (Mean and Standard Deviation)

Country	hecap	ghecap	phecap	ofpcap
Indonesia	249.8671	99.19548	147.6956	107.9053
	(102.4904)	(66.74544)	(47.97503)	(34.67953)
Singapore	2870.088	1298.502	571.586	1031.536
	(1365.114)	(953.7125)	(440.3465)	(200.2997)
Malaysia	734.8482	388.1598	346.6776	255.1862
	(266.1519)	(147.6448)	(119.7713)	(89.1483)

Table 2 displays the average values and standard deviations (in parentheses) for the four types of per capita health expenditure, expressed in current international dollars with purchasing power parity (PPP) adjustment, for the period 2000-2021. Singapore recorded the highest value of per capita health expenditure ($2870.088), far above Malaysia ($734.8482) and Indonesia ($249.8671). A similar pattern was observed in government healthcare spending, where Singapore excelled on average ($ 1,298,502), followed by Malaysia ($ 388,159) and Indonesia ($ 99,195). The highest ranking for private health expenditure per capita remains in Singapore ($571.59), followed by Malaysia ($346.68) and Indonesia ($147.70). Meanwhile, the highest direct health expenditure per capita from personal pockets was recorded in Malaysia ($255.19), followed by Singapore ($1031.54) and Indonesia ($107.91).

Figure 2 and Table 3 present the estimated total per capita health expenditure in US dollars for Indonesia, Singapore, and Malaysia from 2022 to 2035, adjusted for purchasing power parity (PPP) and inflation. Projections show that the per capita health expenditure level in 2035 will be the highest in Malaysia, Singapore, and Indonesia. Based on estimates, in 2035, the per capita health expenditure for Malaysia is estimated at $ 1,875,623 (95% PI: $1,587,060 - $2,164,187), for Singapore at $ 17,897,336 (95% PI: $2,726,342 - $33,068,331), and for Indonesia at $ 1,472,558 (95% PI: $582,709 - $2,362,408).

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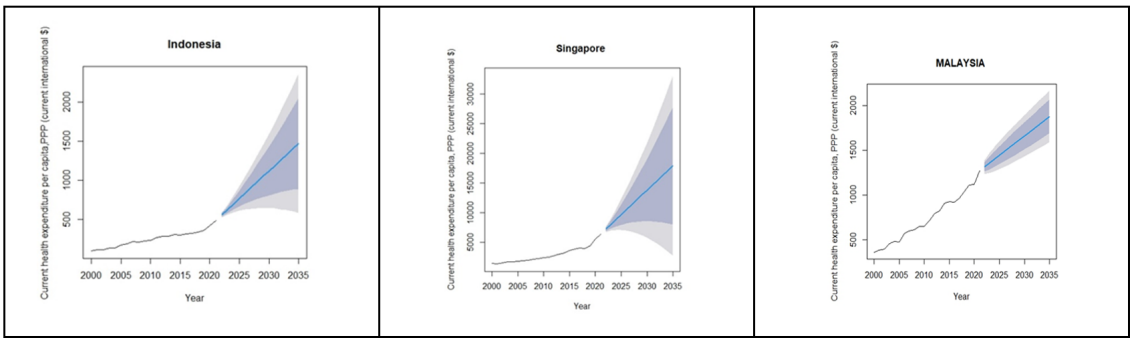
Table 3. Projected Health Expenditure for 2025, 2030, and 2035 (per capita)

Country	2025	2030	2035	%Growth 2025-2035
Indonesia	765.9450	1120.4361	1472.5586	92.25%
	(609.0629, 922.8271)	(645.1635 ,1595.7086)	(582.7091, 2362.4082)	
Singapore	9651.113	13774.225	17897.336	85.44%
	(7042.908 ,12259.317)	(5735.198, 21813.251)	(2726.342 ,33068.331)	
Malaysia	1441.758	1658.691	1875.623	30.09%
	(1287.515, 1596.002)	(1427.325, 1890.056)	(1587.060, 2164.187)	

Figure 2. Current Health Expenditure of Indonesia, Singapore and Malaysia



Source: Data processed (2025)

Projected government health-sector expenditure per capita for 2025, 2030, and 2035 is shown in Table 4. By 2025, per capita government expenditure on the health sector is projected to be $516.22 (95% PI: 379.06–653.38) for Indonesia, $ 6,760.03 (95% PI: 4,371.19–9,148.87) for Singapore, and $832.88 (95% PI: 683.26–982.50) for Malaysia. By 2030, the value of this health expenditure increases to $802.90 (95% PI: 400.55–1205.25) for Indonesia, $ 10,207.81 (95% PI: 2,844.92–17,570.71) for Singapore, and $832.88 (95% PI: 683.26–982.50) for Malaysia.

By 2030, the value of this health expenditure increases to $802.90 (95% PI: 400.55–1205.25) for Indonesia, $ 10,207.81 (95% PI: 2844.92–17,570.71) for Singapore, and $982.84 (95% PI: 715.63–1,250.06) for Malaysia. Meanwhile, the projected 2035 per capita government expenditure for the health sector in Indonesia is expected to reach $1089.58 (95% PI: 341.88–1837.28), while in Singapore it is $13655.59 (95% PI: -239.43–27550.61) and in Malaysia it is $1132.81 (95% PI: 745.47–1520.15).

Table 4. Projected Government Health Expenditure for 2025, 2030, and 2035 (per capita)

Country	2025	2030	2035	%Growth 2025-2035
Indonesia	516.2201	802.8983	1089.5790	111.07%
	(379.0620, 653.3782)	(400.5478, 1205.2488)	(341.8768, 1837.2812)	
Singapore	6760.031	10207.810	13655.590	102%
	(4371.1920, 9148.869)	(2844.915, 17570.706)	(-239.4313, 27550.612)	
Malaysia	832.8770	982.8438	1132.8106	36.01%
	(683.2581 982.4958)	(715.6305, 1250.0571)	(745.4682, 1520.1530)	

Table 5. Projected Private Sector Health Expenditure for 2025, 2030, and 2035 (per capita)

Country	2025	2030	2035	%Growth 2025-2035
Indonesia	196.1074	208.5270	220.9466	12.67%
	(108.78212, 283.4326)	(-7.35622, 424.4102)	(-155.32950, 597.2228)	
Singapore	2622.227	2961.490	3300.754	25.88%
	(2406.685, 2837.768)	(2638.178, 3284.803)	(2897.513, 3703.995)	
Malaysia	624.7349	711.5849	798.4349	27.8%
	(574.6644, 674.8055)	(636.4792, 786.6907)	(704.7615, 892.1082)	

In terms of projected private sector expenditure on health in 2025, the estimated per capita private sector spending in Indonesia is projected to be $196.11, with a 95% prediction interval ranging from $108.78 to $283.43. In Singapore, the figure is significantly higher at $2,622.23, with a 95% prediction interval of $2,406.69 to $2,837.77. Malaysia's estimated expenditure stands at $624.73, with a 95% prediction interval of $574.66 to $674.81.

By 2030, Indonesia's private sector spending is expected to increase to $208.53, though the range is vast, from -$7.36 to $424.41. For Singapore, the projected amount rises to $2,961.49, with a 95% prediction interval of $2,638.18 to $3,284.80. In Malaysia, the estimate is $711.58, with a 95% prediction interval of $636.48 to $786.69. Looking ahead to 2035, Indonesia's private sector spending is forecast to reach $220.95, with a lower boundary of -$155.33, indicating high uncertainty, and an upper bound of $597.22. In Singapore, health expenditure is projected to be $3,300.75, with a 95% prediction

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interval of $2,897.51 to $3,703.99. In Malaysia, the estimated expenditure is $798.43, with a 95% prediction interval of $704.76 to $892.11. Table 5 provides detailed data on these projections.

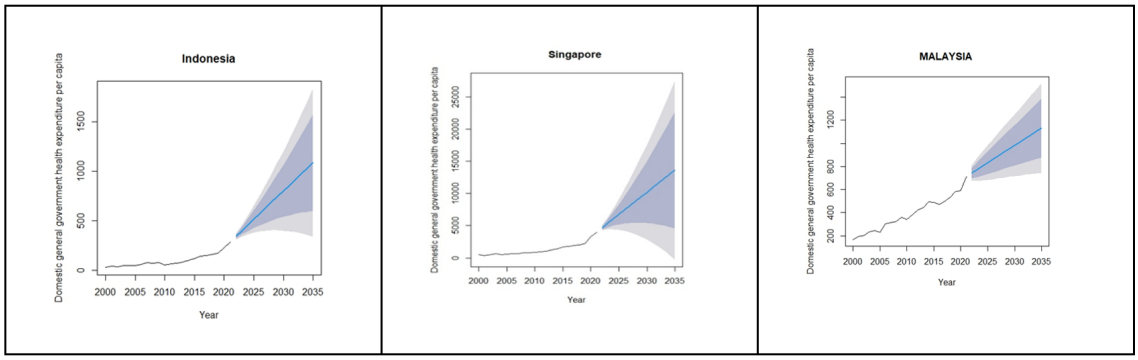
The projections in Table 6 indicate that out-of-pocket per capita shows an increasing trend across the three countries under study: Indonesia, Singapore, and Malaysia. By 2025, Singapore is expected to have the highest per capita expenditure of $1568.12 (95% PI: 1346.30–1789.94), followed by Malaysia with $456.67 (95% PI: 407.68–505.66), while Indonesia recorded the lowest figure of $137.51 (95% PI: 73.46–201.56). The same trend continues in 2030, with Singapore remaining at the top at $ 1,741.61 (95% PI: $1,408.88–$2,074.34), followed by Malaysia at $518.94 (95% PI: $ 445.45–$ 592.42) and Indonesia at $145.38 (95% PI: $ 3.48–$ 287.28). By 2035, the output gap between these countries is expected to become more pronounced. Singapore is projected to spend $1,915.10 per capita (95% PI: $ 1,500.11–$ 2,330.08), while Malaysia increases to $581.20 (95% PI: $ 489.55–$ 672.86). Indonesia is expected to maintain a lower spending of $153.24 (95% PI: -81.90–388.39).

Table 6. Projected Out-of-Pocket Health Expenditure for 2025, 2030, and 2035 (per capita)

Country	2025	2030	2035	%Growth 2025-2035
Indonesia	137.5117	145.3763	153.2408	11.43%
	(73.461237, 201.5622)	(3.476183, 287.2763)	(-81.903676, 388.3853)	
Singapore	1568.118	1741.608	1915.099	22.13%
	(1346.299, 1789.936)	(1408.880, 2074.336)	(1500.114, 2330.084)	
Malaysia	456.6719	518.9373	581.2027	27.27%
	(407.6806, 505.6632)	(445.4504, 592.4242)	(489.5484, 672.8570)	

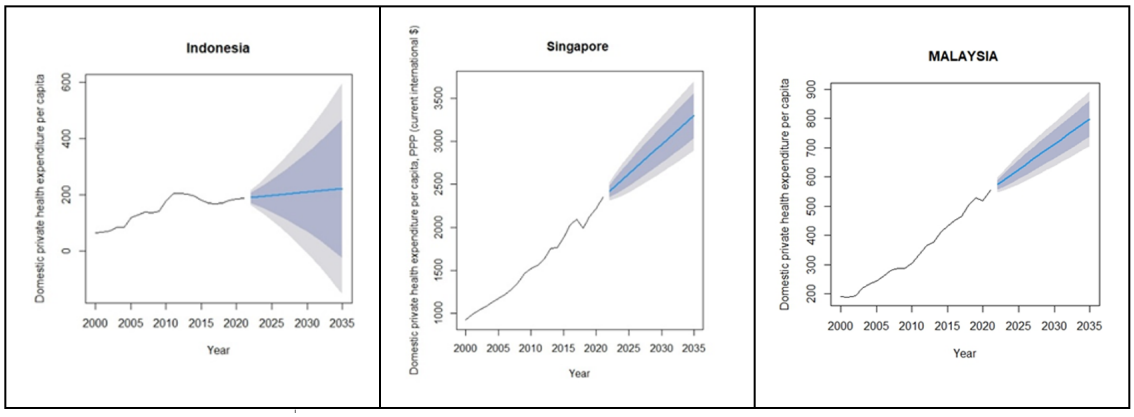
This result aligns with the research by Zheng-Zheng Li et al. (2021), which found that Indonesia's public health expenditure is converging, whereas its private health expenditure is diverging. The research shows that only its public health expenditure is catching up with those of ASEAN countries with higher health expenditures. In contrast, Singapore's public health expenditure is becoming more divergent, while its private health expenditure is moving in the opposite direction. This result is attributed to Singapore's status as a developed country, where the government-run insurance and healthcare systems serve 90% of its citizens. Unlike other countries, Malaysia's public and private health expenditure are actually converging. This condition is likely due to their stable, developing economy and moderately high public health spending.

Figure 3. Government Health Expenditure per Capita in Indonesia, Singapore and Malaysia



Source: Data processed (2025)

Figure 4. Domestic Private Health Expenditure per Capita in Indonesia, Singapore and Malaysia



Source: Data processed (2025

In this section, we will discuss health spending in Indonesia. With per capita health expenditure estimated to continue increasing, the government needs a strategy to reduce the burden on the community. This burden reduction aims to maintain people's purchasing power and improve their welfare (Gourley et al., 2021). One strategy the government can implement is to increase government spending in the health sector. According to World Bank data from 2022, Indonesia spends only about 1.39% of its national GDP on health. This figure ranks Indonesia fourth-lowest in health expenditure among Southeast Asian countries, with Timor-Leste having the highest health sector spending (10.31%), followed by Thailand (3.89%). By increasing spending in the health sector, the government can significantly enhance the quality of national healthcare (Deka, 2020). Furthermore, allowing an increase in national health expenditure can help improve national economic performance, as maintaining health is strongly correlated with a nation's capacity to generate income and the productivity of its labor (Raghupathi et al., 2020).

One way to ensure the performance of government health spending is to restore the mandatory spending policy in the health sector, which was previously abolished in Act No. 17 of 2023 (Rambe et al., 2024). This mandatory spending policy can be

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further developed using the WHO recommendations—5-6% of the state budget—and adjusted to a higher or lower level, depending on regional needs. The implementation of this policy has been proven to reduce the health disparity rate and improve welfare and quality in health services, as seen in the United States (Westmoreland et al., 2006) and the United Kingdom (Charlesworth et al., 2021)

However, government spending in the health sector must also be followed by efficient and effective planning in its implementation. As the health burden is expected to increase in the coming years, the government needs to consider several measures to ensure public health, including financially revitalizing the National Health Insurance system. One of the most concerning health issues in Indonesia is the habit of smoking. A report by the Global Adult Tobacco Survey (GATS) in 2021 showed that around 34.5% of adults in Indonesia consume tobacco products. Although this is concerning, it also means that the national revenue from cigarette excise is high. Through PMK No. 143 of 2023, the government has determined that around 37.5% of cigarette excise proceeds must be allocated to the Health Insurance Administration Agency (BPJS). This figure is still much lower than the previous regulation, under Law 31 No. 28 of 2009, where the cigarette excise allocated to BPJS is a minimum of 50%. By reconsidering this allocation figure, the government can secure additional funding for the health insurance system. In addition, the government can implement incentives for healthy habits, such as supporting daily walking or running programs, quitting smoking, regular health check-ups, and weight-loss programs that can be tracked through the application. This healthy habit incentive program has been implemented in the Netherlands through the Samengezond program and has been shown to impact public health positively (Agachi et al., 2024).

The discussion will continue by examining conditions in Singapore. Singapore's projected per capita health expenditure growth shows a significant spike trend. Based on 2021 data, per capita health expenditure reached $ 6,352.62 and is projected to increase by $ 17,897,336 in 2035, or grow by around 181.73%. Government spending for the government sector is projected to reach $13655,590 in 2025, rising 241% from 2021. Private spending is projected to reach $3300,754 by 2035.

Meanwhile, the surge in Out-Of-Pocket expenditure is estimated to reach $1,915 per capita in 2035. This surge, driven by inflation and economic growth, poses a threat to the health system, as changes in demand will destabilize it. In this context, Singapore faces a demographic threat, namely a rapidly aging population. Singapore is projected to have a proportion of citizens aged 65 years and above by 2030, reaching 23–25% of the total population (Chan, 2017). The growth of the elderly population, coupled with the increasing prevalence of chronic diseases, puts substantial pressure on intermediate and long-term care (ILTC) services and a burden on the health system as a whole (Tan et al., 2021). This is reflected in the finding that the median annual healthcare cost per capita for patients with multimorbidity (SGD 682) is almost twice that of patients without multimorbidity (S. Tan et al., 2021). Correspondingly, the average annual medical cost for patients with type 2 diabetes mellitus in Singapore was found to be

US$2,034, with 61% from inpatient services, 35% from outpatient services, and 4% from emergency department (A&E) services. This data indicates an increase in multimorbidity and complications of chronic diseases with significant implications for the structure and sustainability of health financing.

Singapore has an efficient health system that spends only 4-5% of its national income (GDP) on the health sector, well below the levels in many other countries. According to the aforementioned figure, only a third of the cost is covered by the Singapore government, while the community bears the remaining two-thirds through the health savings system, insurance, or direct payments (Lim, 2017). By allocating around 4–5% of GDP to health, Singapore's Universal Health Coverage (UHC) Index is 88/100 in 2021, while compared to the group of countries with government health expenditure of 4.01–8% of GDP, it has an average UHC Index of around 59 (Lozano et al., 2020).

Singapore's health financing system emphasizes individual responsibility, with programs such as MediSave, MediShield Life, and government subsidies through MediFund, all of which focus on inpatient care (Ministry of Health, 2024). However, the existence of this structure poses an equity challenge related to personal income, especially for outpatient treatment or expensive long-term care, which disproportionately affects low-income communities, despite this approach potentially keeping government spending low (Myint et al., 2019). According to the Commonwealth Fund website, Medisave has not been able to reach nursing homes or home- or center-based services. In addition, outpatient costs, such as GP visits or specialist clinics, can vary widely and sometimes exceed MediSave savings (Earn, 2020). With these conditions, Singapore is expected to implement more comprehensive interventions by strengthening health savings schemes, such as MediSave, and developing preventive strategies to reduce the prevalence of chronic diseases.

The final discussion will focus on the conditions in Malaysia. Malaysia's projected healthcare spending shows a gradual upward trend, with an estimated per capita health expenditure reaching $1,875 by 2035, representing a 30.09% increase from 2025. Despite the increase, this growth rate is significantly lower than that of Singapore (85.44%) and Indonesia (92.25%), indicating potential stagnation in health financing relative to future needs. One of the key factors is limited fiscal space, as public spending on health in Malaysia remains 4.4% of gross domestic product (GDP), below the WHO-recommended range of 5–6% needed to achieve universal health coverage (UHC). This is further exacerbated by the high burden of out-of-pocket (OOP) expenditures by households, which accounted for 31.5% of total healthcare spending in 2021 (Ministry of Health Malaysia, 2023). This situation can increase the risk of potentially heavy financial burdens for households, especially for vulnerable groups. Inequities in the distribution of health resources can also worsen access to services. As Lim et al. (2017) found, access to primary healthcare in rural areas of Malaysia lags behind that in urban areas in terms of the number of facilities, the number of health workers, and the level of services offered.

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In addition to the fiscal aspect, Malaysia's health system also faces structural problems. According to the 2023 Ipsos Health Service Monitor report, Malaysians identify several key issues, including long waiting times (50%), shortages of medical personnel (45%), and the high cost of care (45%). However, public trust in the health system remains high, with Malaysia ranked third globally in terms of trust in healthcare services, after Singapore and Switzerland (IPSOS, 2023). This data shows that despite significant pressure on the system, public confidence in the skills and quality of health professionals' services remains unshaken. However, without an accompanying systemic approach to addressing capacity and efficiency issues, this high level of trust risks becoming a paradox.

Given the complexity of challenges in Malaysia's health system and projected health expenditures, a planned policy strategy is needed, including optimizing the distribution of health workers by providing competitive incentives based on geographical needs to overcome inequality in access to health services, especially in remote areas. Another idea is to strengthen sectoral collaboration by developing public-private partnerships, which are crucial for enhancing efficiency, expanding capacity, and driving innovation in the provision of healthcare facilities.

Indonesia, Malaysia, and Singapore have striking differences in health expenditure projections. The state of Singapore nominally and effectively leads the world in per capita health expenditure, but it still faces challenges in access and personal cost burdens. Malaysia recorded moderate growth, but this risked stagnation without reforms. Meanwhile, Indonesia is projected to experience the highest growth in percentage terms; however, it still lags in nominal terms and faces challenges, including low government spending and service inequality. In this comparison, Singapore is in the best position, although the country is not free from challenges in healthcare expenditure. However, Indonesia has a unique opportunity to enhance the effectiveness of its fiscal policies and allocations.

CONCLUSION

The study shows that the trend of per capita health expenditure in Indonesia, Singapore, and Malaysia is projected to increase across all financing sources—government, private financing, and private spending—until 2035. The results show an increase in health expenditure across all components in all three countries. Singapore is projected to see increases across all health expenditure components. Indonesia is projected to experience the highest growth rate, although its nominal rate is significantly lower than Singapore's. In Malaysia, it is expected to experience more moderate growth than the other two countries.

The findings reveal challenges in ASEAN, including a high out-of-pocket burden, high costs of treating chronic diseases, and unequal access to health services. The governments of the three countries must prioritize increasing budget allocation, such as reinstating mandatory spending in Indonesia and increasing public spending in

Malaysia. Revitalization of financing schemes is also crucial, for example, by increasing the allocation of cigarette excise for BPJS Kesehatan in Indonesia and expanding MediSave coverage in Singapore. In addition, a shift in focus to prevention through health incentive programs, system optimization with incentives for medical personnel, and public-private partnerships will ensure a sustainable and equitable health system. Therefore, policies that prioritize strengthening government health allocations, enhancing health insurance schemes, increasing the budget for health programs while maintaining the principle of efficiency in budget management, and optimizing investment ratios between preventive and curative care efforts to achieve Universal Health Coverage (UHC) are needed.

The ARIMA model is employed in this study to predict per capita health spending from both government and private sources, as well as out-of-pocket expenditures, from 2022 to 2035. Although the ARIMA model is generally recognized as effective in predicting time series data, its application in health expenditure projections has several limitations. First, the ARIMA Model used can predict the short term, but as the forecasting period increases, its accuracy decreases (Luo et al., 2017). Second, the ARIMA model is conventionally designed to handle univariate and linear time series, so it has limitations in capturing a wide range of complex relationships (Wang et al., 2024), as is often the case in health expenditure data. These limitations restrict the model's ability to account for the various factors that contribute to changes in health expenditure, such as economic shocks, epidemics, and regulatory changes. Third, there are several cases of uncertainty in the projection results that are reflected in the wide prediction interval, one of the factors that is suspected to be due to the limitations of historical data, specifically the range of health expenditure data covering the period 2000-2021, which limits the model's ability to identify long-term trends reliably.

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