OXFORD JOURNAL
OF STUDENT
SCHOLARSHIP

Can Out-of-Pocket Healthcare Spending Influence Public Health Investment? Evidence from SAARC Nations

Ada Chandra
adachandra2009@gmail.com

ABSTRACT

Healthcare expenditure is a key component of economic development and population well-being, particularly in developing countries. This study investigates the impact of out-of-pocket healthcare expenditure on domestic general government healthcare expenditure across SAARC countries, while controlling for GDP growth, population, and life expectancy. Panel data obtained from the World Bank between 2000 and 2024 were analysed using Stata. Correlation analysis, VIF, Hausman, Wooldridge, and Modified Wald tests were conducted as diagnostics before estimating a Fixed Effects regression model with robust standard errors. The results indicate that out-of-pocket healthcare expenditure has a significant negative effect on government healthcare expenditure at 10 percent significance level. Life expectancy also showed a significant negative relationship, while GDP growth and population were not statistically significant. These findings suggest that healthcare financing structures influence government healthcare expenditure more than macroeconomic or demographic factors. The study highlights the importance of increasing public healthcare investment, improving spending efficiency, and reducing reliance on out-of-pocket payments to strengthen financial protection and support Universal Health Coverage across SAARC countries. Overall, the findings contribute to understanding healthcare financing in South Asia and provide evidence to support future healthcare policy decisions.

Keywords*: healthcare, economic growth, out-of-pocket expenditure, SAARC, fixed effects, life expectancy*

INTRODUCTION

1.1. General Background

To ensure the stability of health programmes, government spending on health is an important indicator of a government's commitment to ensuring better health of its people. In addition to limited resources, administrative capacity can help address healthcare needs, as it poses obstacles for developing governments (Schieber & Maeda, 1999). In many developing economies worldwide, economic challenges such as insufficient funding, limited access to resources, workforce shortages, high

out-of-pocket expenditures, and infrastructure gaps hinder the provision of accessible, high-quality healthcare (Yaser Mohammed Al-Worafi, 2023).

Healthcare financing is a major issue in developing and low- and middle-income countries, as past studies have shown that healthcare budgets depend on an economy's macro-fiscal policies. Examples of such macro-fiscal policies include sustained economic growth and higher revenue mobilisation (Behera & Dash, 2019). Additionally, LMICs face resource constraints, and healthcare systems in such countries have limited access to advanced medical technologies (Shashwati Pankaj et al., 2024). In LMICs, Health Technology Assessment (HTA) processes may be non-traditional, which can limit comprehensive evaluations, the development of clinical guidelines, and international recommendations (Shashwati Pankaj et al., 2024).

The SAARC region is known to have some of the poorest health indicators in the world, as it hosts the largest population with micronutrient deficiencies and diabetes ("South Asian Health: What Is to Be Done?," 2004). Moreover, healthcare systems across SAARC countries vary. For example, Sri Lanka has a free public healthcare system, whereas Bangladesh relies on out-of-pocket expenditure. This shows how many SAARC countries face significant healthcare inequalities due to limited insurance coverage and reliance on OOPE. This places a greater financial burden on low-income populations and reduces access to healthcare (Huq et al., 2024). A government's expenditure is cardinal for achieving Universal

Healthcare Coverage and addressing health disparities. However, in SAARC countries, there was no convergence in healthcare expenditure in terms of it being a part of the GDP among such nations, which showcases increasing disparities and underscores the importance and need for better fiscal coordination in the region and policy alignment to ensure better provision of healthcare (Chandra & Bhoomadevi, 2026). Many SAARC Countries end up being dependent on private and informal healthcare providers due to shortages in trained public healthcare professionals. In rural areas, many informal providers account for 75% of primary caregivers, highlighting reliance on them (Nayak et al., 2022).

Out-of-pocket expenditures finance many families' healthcare costs, as a lack of health insurance and weak social safety nets lead to this in most low-income and developing countries. OOPE leaves many low-income families without access to healthcare when needed because they cannot afford it (Roy & Howard, 2007). In Asia, OOPE is the primary source of financing healthcare. For example, in India, healthcare is primarily paid for through OOPE payments by households (Bhojani et al., 2012).

The trajectory of public healthcare expenditure (PHE) depends on many major factors, especially in Pakistan, a SAARC country. In the long term, factors such as income, environmental degradation, and healthcare infrastructure and services will positively impact PHE (Saleem et al., 2021). In India, low PHE was associated with lower composite index values and a higher infant mortality rate (Das, 2024). This means that India contributes a small percentage to PHE (Bhat & Jain, 2006).

OOPE payments for healthcare arise from limited healthcare coverage in SAARC countries, posing economic hardship and reducing access to healthcare. Economists and researchers in the field of health

economics believe the increasing burden of OOPE in SAARC countries is due to factors such as less spending on PHE in a country (Bhat & Jain, 2006b), a rise in the dependence on private healthcare (Sengupta et al., 2017), an ageing population (Office, 2025), and poor healthcare coverage (Financial Protection, n.d.) and (Kaiser et al., 2023). These factors highlight the need for greater investment in healthcare and the expansion of health insurance schemes.

Universal Healthcare Coverage means that all people have access to the full range of high-quality healthcare; however, when people face high OOPE, the health system fails to provide universal access without financial hardship, indicating insufficient public healthcare coverage (World Health Organisation, 2025).

If people using health services face financial hardship, it can lead to higher spending, making poorer households more vulnerable. This arises when healthcare costs consume a big share of a household's income (Health at a Glance 2023: Financial Hardship and Out-of-Pocket Expenditure, 2023).

High OOPE can deter the use of healthcare resources, leading to poor health outcomes; hence, reducing OOPE is important. Additionally, because many people cannot afford healthcare, they forgo these services, highlighting how high OOPE reduces access to healthcare (Kaladharan & Manayath, 2024).

According to WHO, in 2022, 2.1 billion people faced financial hardship, including 1.6 billion living in poverty or pushed deeper into it due to high OOPE. Additionally, WHO stated that UHC is still facing challenges with inequality, particularly along geographical, educational and economic lines. (World Health Organisation, 2025). High OOPE remains a significant source of healthcare financing, accounting for over 35% of global health spending. Even though reliance on OOPE is decreasing, WHO emphasises that increased domestic government spending is essential to achieving health coverage (Jasarevic, 2019).

Financial protection is weakened if a health system is over-reliant on OOPE, suggesting that when public financing is insufficient, households must pay more. Additionally, greater reliance on private spending can lead to higher financial burdens on households (Financial Hardship and Out-of-Pocket Expenditure: Health at a Glance 2025, 2025).

Low public spending → poor public healthcare quality/access → higher OOPE. As said by the OECD, "Countries can reduce their reliance on OOP payments by increasing public spending on health.", implying that when public spending is inadequate, households end up paying more out of pocket, often because public services are insufficient(Financial Hardship and Out-of-Pocket Expenditure: Health at a Glance 2025, 2025. Increased OOPE and public pressure → governments may increase healthcare expenditure. High OOPE creates pressure on governments to expand PHE to improve financial protection. This is because increased domestic spending is essential to achieving UHC (World Health Organisation, 2019). According to WHO, government spending only reduces inequities in access when lonely locations are carefully planned to ensure that the entire population can obtain primary health care. This supports the argument that healthcare suffers from market failure because the private market alone does not ensure equitable access, thereby requiring government intervention(World Health Organisation

2019). Additionally, the OECD states that population entitlement to publicly financed healthcare is a prerequisite for financial protection. This demonstrates that without government provision and financing, many households face financial hardship and unequal access to healthcare (OECD, 2025).

1.2.Literature Review

The relationship between out-of-pocket expenditure and government healthcare expenditure has been explored widely in the literature. One such study conducted by Nguyen et al. (2023) aimed to analyse the impact of public health insurance expansion on healthcare utilisation and out-of-pocket expenditures in middle- and low-income households in Vietnam. Using an observational study design based on national cross-sectional survey data from the Vietnam Household Living Standard Surveys (a large, nationally representative sample), the study collected quantitative data on healthcare usage and insurance coverage. The data were assessed using a doubly robust difference-in-differences analysis to compare outcomes before and after the policy change. Based on the results, the study found that health insurance expansion significantly increased enrollment among middle- and low-income groups. It also led to greater healthcare utilisation, with more frequent use of medical services among insured individuals. However, there was no significant reduction in out-of-pocket healthcare expenditure. Overall, the findings suggest that insurance expansion improves access to healthcare.

Particularly for Sri Lanka, a research by Kumara and Samaratunge (2019) examined the relationship between healthcare utilisation and out-of-pocket healthcare expenditure. Using a quantitative observational design, data were collected from a large national household survey. The data were analysed using econometric modelling techniques. The study found that increased use of healthcare services leads to higher out-of-pocket spending, especially when private healthcare is used. Despite free public healthcare, households still face significant expenses. Overall, the findings suggest that healthcare use can create a financial burden, highlighting the need for improved policies.

In the same realm, Aase et al. (2021) aimed to explore how healthcare managers and staff conceptualise "quality" in nursing homes and homecare settings. Using a qualitative cross-sectional design, data were collected through focus groups and individual interviews from 65 healthcare professionals (managers, nurses, and assistant nurses). The data were analysed using thematic analysis to identify key patterns and meanings in participants' understanding of quality. Based on the results, the study found that quality is viewed as a multidimensional concept encompassing professional competence, teamwork, and patient-centred care. Different roles (managers vs staff) emphasised different aspects of quality. It also highlighted the importance of collaboration and shared understanding in improving care.
Overall, the findings suggest that quality in healthcare goes beyond measurable outcomes and encompasses values such as dignity and professional pride.

Similarly, the key factors influencing out-of-pocket healthcare expenditure among households in Bangladesh were analysed by Molla et al. (2017) in their research. Using a quantitative observational design, data were collected from a large nationally representative household survey. The data were analysed using multiple regression analysis to identify significant predictors of healthcare spending. The

study found that households with members suffering from chronic illnesses had significantly higher healthcare expenditure. Higher-income households tended to spend more, likely due to greater ability to access services. Health shocks and larger household size also contributed to increased spending. Urban households generally spent more than rural households. Overall, the findings indicate that healthcare expenses place a considerable financial burden on households, emphasising the need for improved financial protection and healthcare policies.

Schneider et al. (2021) performed a study which aimed to analyse trends in primary healthcare (PHC) expenditure and its impact on health outcomes in low- and middle-income countries between 2000 and 2017. Using a quantitative observational design, data were collected from multiple international databases, including national health accounts and household surveys across several countries. The data were analysed using regression analysis to examine the relationship between PHC spending and health indicators. The study found that PHC expenditure increased steadily over time in most countries. Higher PHC spending was associated with improvements in maternal and child health outcomes, including reduced mortality and improved service coverage. However, PHC spending showed limited impact on reducing overall disease burden, particularly for non-communicable diseases. Overall, the findings suggest that while PHC investment is beneficial for specific health outcomes, health systems need to broaden their focus to address broader and emerging health issues.

In 2020, Rajan et al. aimed to analyse the association between depression and healthcare utilisation and out-of-pocket (OOP) healthcare expenditure among adults in Nepal. Using a quantitative cross-sectional design, data were collected from a population-based survey of 2040 adults who were assessed for depression using the PHQ-9 and reported their healthcare use. The data were analysed using negative binomial regression to examine the relationship between depression severity, healthcare visits, and expenditure. The study found that individuals with higher levels of depression were more likely to use healthcare services and had higher OOP expenditures. Healthcare utilisation and costs increased consistently with increasing depression severity. Overall, the findings suggest that depression contributes to greater healthcare use and financial burden, highlighting the need for integrating mental health services into healthcare systems.

Sriram and Khan (2020) aimed to analyse the effect of public health insurance programs for people with low incomes on healthcare utilisation and out-of-pocket (OOP) inpatient expenditure in India. Using a quantitative cross-sectional design, data were collected from a nationally representative survey of 64,270 individuals below the poverty line. The data were analysed using propensity score matching, along with logistic regression, Tobit, and two-part models, to examine hospitalisation rates, length of stay, and OOP costs. The study found that individuals enrolled in public health insurance programs were more likely to be hospitalised, indicating increased healthcare utilisation. However, the insurance coverage did not significantly reduce out-of-pocket expenditure or length of hospital stay. Overall, the findings suggest that while insurance improves access to inpatient care, it does not provide sufficient financial protection, highlighting the need to expand coverage to outpatient services.

In 2017, Nandi et al. aimed to analyse the impact of a universal government health insurance scheme on hospital utilisation and out-of-pocket (OOP) expenditure in Chhattisgarh, India. Using a quantitative cross-sectional design, data were collected from the National Sample Survey (2014) involving a sample of 6,026 individuals. The data were analysed using descriptive statistics and multivariate regression to examine factors influencing hospitalisation and healthcare spending. The study found that insured individuals had slightly higher hospitalisation rates and were more likely to use public healthcare services, especially among poorer and rural populations. Despite insurance coverage, a large proportion of individuals still incurred OOP costs, with costs significantly higher at private hospitals. A substantial number of households also experienced catastrophic health expenditure. Overall, the findings suggest that while government insurance improves access to healthcare, it does not provide adequate financial protection.

John Tayu Lee et al. (2015) aimed to analyse the impact of non-communicable disease (NCD) multimorbidity on healthcare utilisation and out-of-pocket (OOP) expenditure in middle-income countries. Using a quantitative cross-sectional design, data were collected from the WHO Study on Global Ageing and Adult Health (SAGE) across six countries (China, Ghana, India, Mexico, Russia, and South Africa). The data were analysed using logistic, negative binomial, and log-linear regression models to examine the relationship between the number of chronic conditions, healthcare use, and expenditure. The study found that individuals with multiple chronic conditions had significantly higher healthcare utilisation, including more outpatient visits and hospitalisations. It also showed that out-of-pocket expenditure increased with the number of diseases, with medicines forming the largest share of costs. Overall, the findings indicate that multimorbidity increases healthcare demand and financial burden, highlighting the need for stronger health systems and financial protection policies.

Finally, Chetna Malhotra and Young Kyung Do (2017) aimed to analyse the relationship between public health expenditure and health system responsiveness, particularly for low-income individuals across countries. Using a quantitative cross-sectional design, data were collected from the World Health Survey, which covered 63 countries and focused on various dimensions of healthcare responsiveness, including dignity, prompt attention, and service quality. The data were analysed using hierarchical ordered probit models and linear regression techniques to examine associations between public health spending and responsiveness outcomes. The study found that higher public health expenditure was associated with better health system responsiveness among the poorest individuals and with reduced inequality in care experiences between the rich and the poor. Overall, the findings suggest that increasing public health spending can improve quality of care and equity in healthcare systems.

1.3. Research Gap and Rationale of the Study

Even though healthcare financing is widely examined in developing countries, such as those in the SAARC region, current research largely focuses on individual determinants, such as public healthcare expenditure, out-of-pocket expenditure, or health outcomes in isolation. Comparatively, there are fewer studies investigating the relationship between government healthcare spending and household out-of-pocket expenditure in the SAARC region. While many studies discuss the financing challenges

that developing economies face, there is limited literature on how differences in healthcare financing models influence the financial burden experienced by households across SAARC countries. This creates a gap in understanding whether higher levels of public healthcare expenditure are consistently linked with lower out-of-pocket spending. This research aims to examine this relationship in the SAARC region, provide a broader economic analysis of healthcare financing, and offer insights applicable at both national and international levels.

This research contributes to existing research by providing concrete evidence of the relationship between public healthcare expenditure and out-of-pocket expenditure across SAARC countries. The findings will help policymakers evaluate whether increases in factors such as government healthcare investment are linked to greater financial protection for households. By comparing countries within a region, the study will identify patterns that may provide insight into how financial healthcare can be effective and strategies to encourage the adoption of successful policies. Additionally, this literature can contribute to discussions around the resource allocation of public resources and the achievement of Universal Health Coverage. This study therefore offers practical value to governments, researchers, and healthcare planners seeking to strengthen equitable and sustainable healthcare financing systems.

METHODOLOGY

2.1. Research aim and objectives

This study examines the relationship between out-of-pocket healthcare expenditure and domestic general government healthcare expenditure across SAARC countries. The following objectives were considered in this research.

- Identify the key determinants of government healthcare expenditure in the SAARC region.
- Determine whether greater reliance on direct household healthcare payments influences government healthcare spending.
- Analyse this relationship while accounting for GDP growth, population, and life expectancy.
- Provide evidence to support more effective healthcare financing policies.
- Contribute to improving financial protection and healthcare accessibility across SAARC countries.

2.2. Research hypotheses

The null hypotheses assumed in the regression model:

NH1: No significant impact of out-of-pocket expenditure on public healthcare expenditure

NH2: No significant impact of GDP growth on public healthcare expenditure

NH3: No significant impact of population on public healthcare expenditure

NH4: No significant impact of life expectancy on public healthcare expenditure

2.3. Data and description of variables

This dataset contains observations on SAARC countries for the period 2000-2024, the data was unbalanced as there were missing values. the values were generated using interpolation method Panel data techniques solve two main problems:(1) omitted variable bias (individual-fixed effects or unobserved heterogeneity) and (2) endogeneity bias(Zamore, 2022). This panel data set combines cross-sectional data (Countries) and time-series dimensions (years). In this type of cross-sectional study, either the entire population or a subset thereof is selected, and data are collected from these individuals to address the research questions of interest. It is called cross-sectional because the information gathered about X and Y represents what is going on at only one point in time (Olsen & George, 2004). Time series data typically exhibit patterns, including trends, seasonal fluctuations, irregular cycles, and sporadic changes in level or variability, across domains such as business, economics, environmental science, medicine, and other sciences (Jose, 2022). This dataset was originally declared as panel data, using the country identification variable and the year variable. This allows the statistical software to recognise repeated observations for each country over time and apply panel data estimation techniques appropriately.

Variables

1. HEALTH_EXP: Domestic General Government Healthcare Expenditure per Capita is measured using Current US$ per capita. It measures the amount of government healthcare spending per person in a country. In this study, the dependent variable is the level of government healthcare spending, which is examined to assess how out-of-pocket healthcare expenditure and other economic and demographic factors affect it (Sofi & Yasmin, 2024).

2. OOPE: Out-of-pocket healthcare expenditure is measured using the percentage of current healthcare expenditure. This variable measures healthcare expenses paid directly by households rather than by government, insurance providers or other third parties. This variable is the main independent variable, as this study examines whether greater reliance on direct household payments is associated with changes in government healthcare expenditure. It also indicates the extent to which individuals bear the financial burden of healthcare (Billig et al., 2023).

3. GDP: GDP growth measures the annual percentage change in the value of goods and services produced by an economy. GDP growth was included as a control variable to account for changes in economic performance, as stronger economic growth may increase government revenues and, consequently, the government's capacity to finance healthcare (Jakovljevic et al., 2020).

4. POPN: Population is the total number of people residing in a country. It was chosen as a control variable because a larger population may increase overall demand for healthcare services and, consequently, influence the amount that governments need to spend on healthcare (Julien, 1993).

5. LIFE: Life expectancy at birth represents the average number of years a newborn is expected to live if prevailing mortality patterns remain constant. Life expectancy was included as an indicator of population health and healthcare needs. Differences in population health may influence the level of government expenditure required to provide healthcare services. It is measured in years (Woolf & Schoomaker, 2019).

2.4. Correlation analysis

Correlation is a statistical measure used to assess the association between two variables. The value of correlation is numerically shown by a coefficient of correlation, most often by Pearson's or Spearman's coefficient, while a P value expresses the significance of the coefficient. A correlation matrix was generated to examine the pairwise relationships among the independent variables. The correlation coefficient ranges from -1 to +1, where values close to 1 indicate a stronger relationship, while values close to 0 indicate a weaker relationship. A correlation coefficient greater than 0.8 typically indicates problematic collinearity.

Table 1: Pearson Correlation Matrix of Independent Variables

Variables	(1)	(2)	(3)	(4)
(1) OOPE	1.000			
(2) GDP	0.004	1.000		
(3) POPN	0.259	0.061	1.000	
(4) LIFE	0.050	0.005	-0.013	1.000

The correlation matrix showed that all pairwise correlations were substantially below the 0.8 threshold. The highest observed correlation was between population and out-of-pocket expenditure (r= 0.259), while the remaining coefficients were close to zero. Hence, no evidence of correlation among the independent variables was identified, and all variables were retained for further analysis.

2.5. Multicollinearity

Multicollinearity refers to the linear relation among two or more variables. It is a data problem that may seriously undermine the reliability of model parameter estimates (Alin, 2010). Before estimating the regression model, multicollinearity among these independent variables was assessed to ensure that highly correlated explanatory variables were not included in the same model. High multicollinearity can create unstable coefficient estimates and reduce the reliability of regression results.

The Variance Inflation Factor (VIF) and tolerance are both widely used measures of multicollinearity between an independent variable and other independent variables in a regression model (O'Brien, 2007). To further examine the multicollinearity, the Variance Inflation Factor (VIF) test was performed. This test measures how much the variance of an estimated regression coefficient is inflated due to correlations among the explanatory variables. A VIF greater than 5 usually indicates multicollinearity, which may adversely affect regression estimates.

Table 2: Variance Inflation Factor (VIF) Test for Multicollinearity

	VIF	1/VIF
POPN	1.077	.929
OOPE	1.075	.93
GDP	1.004	.996
LIFE	1.003	.997
Mean VIF	1.04	.

The VIF values which were obtained were 1.077 for population, 1.075 for out-of-pocket expenditure, 1.004 for GDP growth and 1.003 for life expectancy, with a mean VIF of 1.04/ As all the VIF values were well below the threshold value of 5, these results indicate that multicollinearity is not a concern in the model. This ensures that all independent variables are retained for the subsequent regression analysis.

2.6. Model selection

The following equation is used to determine the effect of out-of-pocket expenditures on government healthcare expenses.

$$HEALTH_EXP_{it} = b_0 + b_1\, OOPE_{it} + b_2\, GDP_{it} + b_3\, POPN_{it} + b_4\, LIFE_{it} + u_{it}$$

As the dataset consists of repeated observations for the SAARC countries over 24 years, panel regression techniques were employed. Panel data analysis requires selecting the most appropriate estimation model, namely the Fixed Effects (FE) or Random Effects (RE) model. Both models were estimated, after which the Hausman specification test was conducted. The fixed-effect model assumes that all studies share a single common effect and, as a result, all of the variance in observed effect sizes is attributable to sampling error. The random-effects model estimates the mean of a distribution of effects, thus assuming that study effect sizes vary from one study to the next. Under this model, variance in observed effect sizes is attributable to both sampling error (within-study variance) and statistical heterogeneity (between-study variance) (Kanters, 2022).

2.7. Hausman Test

The Hausman test is a statistical method used to determine the appropriate choice between fixed-effects and random-effects models in panel data analysis by assessing the consistency of the estimators under different hypotheses about the correlation between regressors and individual effects. A significant Hausman statistic indicates that the fixed-effects model is preferred, whereas a small statistic suggests that the random-effects model is more suitable (Baltagi, 2014). The null hypothesis of the Hausman test states that the Random Effects estimator is consistent and efficient. The Hausman test for the current model produced a Chi-square statistic of 17.458 and a p-value of 0.001. Since the p-value is below the % significance level, the null hypothesis is rejected, indicating that the Random Effects model is inconsistent. Hence, the Fixed Effects model was selected as the most appropriate estimator for the analysis for further diagnostics.

2.8. Diagnostic testing

2.8.1. Heteroskedasticity: Modified Wald Test

A modified Wald test is a statistical procedure used to test parameter restrictions in models where classical Wald tests fail—such as under non-regular conditions, non-linear constraints, or in the presence of groupwise heteroskedasticity, where standard normality assumptions are violated (Lütkepohl & Burda, 1997). The Modified Wald test was subsequently performed to assess heteroskedasticity in the Fixed Effects model. Heteroskedasticity refers to unequal variance of the error terms across panel units, which can potentially lead to inefficient standard errors and unreliable statistical inference.

In this case, the null hypothesis assumes that the error variance is constant across all countries. The Modified Wald test yielded a Chi-square statistic of 284.17, with a p-value of 0.0000. As this value is less than 0.05, the null hypothesis is rejected, which confirms the presence of heteroskedasticity in the model.

2.8.2. Autocorrelation

The Wooldridge test examines serial correlation by regressing the first-difference residuals on their lags. It then tests whether the coefficient on the lagged residuals equals -0.5 (Tilburg Science Hub, 2020). Autocorrelation occurs when error terms are correlated across time, violating one of the assumptions of classical regression. After selecting the Fixed Effects model, the Wooldridge test was conducted to examine first-order autocorrelation in the panel data.

The null hypothesis states that there is no first-order autocorrelation. The test produced an F-statistic of 0.022, with a p-value of 0.8858. As the p-value exceeds 0.05, the null hypothesis is accepted, indicating that the residuals are not serially correlated over time and that the autocorrelation is not a concern for this model

2.8.3. Correction of heteroskedasticity

To correct this violation, the final regression model was estimated using Fixed Effects with robust standard errors, which provides heteroskedasticity-consistent standard errors, while leaving the coefficient estimates unchanged.

RESULTS

3.1. Descriptive Analysis

Descriptive statistics were computed to summarise the characteristics of the variables included in the study. Descriptive statistics present data in a meaningful way for the purpose of understanding what, if anything, will need to be done to the data to prepare it for analysis (McCarthy et al., 2019).

Table 3: Descriptive Statistics of the Study Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
HEALTH_EXP	200	70.775	160.339	.15	914.53
OOPE	200	52.899	19.843	8.03	86.07
GDP	200	5.033	6.152	-32.91	37.51
POPN	200	2.140e+08	4.075e+08	282019	1.451e+09
LIFE	200	102.379	476.078	55.01	6801

Domestic general government healthcare expenditure averaged 70.775, with a standard deviation of 160.339. Across all 8 countries, the minimum observed value was 0.15, while the maximum reached 914.53, underscoring considerable variation in government healthcare expenditure across countries and years. Out-of-pocket expenditure had a mean of 52.899 with a standard deviation of 19.843. These values ranged from 8.03 to 86.07, indicating substantial variation in the proportions of healthcare costs borne directly by individuals.

GDP growth had an average annual growth rate of 5.033%, with a standard deviation of 6.152. The variable ranged from -32.91% to 37.51%, reflecting periods of both significant economic contraction and rapid economic expansion within the sample. The population averaged approximately 214 million people, with a standard deviation of approximately 408 million. Population sizes varied considerably, ranging from 282,019 to approximately 1.451 billion. Life expectancy had a mean value of 102.379 and a standard deviation of 476.078, with values ranging from 55.01 to 6801. These values are unusually large. It suggests that the variable may have been transformed or aggregated into an index rather than standard life expectancy in years, and hence must be interpreted with caution.

To summarise, these tests confirmed that the explanatory variables do not exhibit problematic collinearity, satisfying one of the key assumptions for regression analysis. Furthermore, the descriptive statistics indicate substantial variation across variables, supporting the dataset's suitability for panel regression analysis.

3.2. Regression Analysis

The Fixed Effects regression with robust standard errors was estimated to examine the effect of out-of-pocket healthcare expenditure on domestic general government healthcare expenditure while controlling for GDP growth, population and life expectancy.

Table 4: Fixed Effects Regression Results with Robust Standard Errors

HEALTH_EXP	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
OOPE	-8.992	4.497	-2.00	.086	-19.626	1.642	*
GDP	-.86	.878	-0.98	.36	-2.936	1.216	
POPN	0	0	-1.81	.114	0	0	
LIFE	-.002	.001	-2.05	.08	-.004	0	*
Constant	679.381	306.779	2.21	.062	-46.035	1404.798	*

Mean dependent var	70.775	SD dependent var	160.339
R-squared	0.459	Number of obs	190
F-test	1.969	Prob > F	0.207
Akaike crit. (AIC)	2167.658	Bayesian crit. (BIC)	2180.646

**** p<.01, ** p<.05, * p<.1*

The regression results show that out-of-pocket healthcare expenditure has a negative coefficient (-8.992) and is statistically significant at the 10% level (p=0.086). This indicates that, holding all other variables constant, a one-unit increase in out-of-pocket expenditure directly 8.992 units in domestic general government healthcare expenditure on an average across the SAARC countries in the sample.

This negative relationship is also consistent with the patterns in the dataset. Countries such as Afghanistan, Bangladesh and Pakistan generally exhibit relatively high out-of-pocket expenditure (often exceeding 70% in several years) while maintaining comparatively low levels of government healthcare expenditure. On the other hand, Maldives, Bhutan and Sri Lanka stand in contrast, as their out-of-pocket expenditure is considerably lower and they generally report substantially higher levels of government healthcare expenditure. This pattern supports the inverse relationship identified by the regression model.

The coefficient for GDP growth is -0.860, with a p-value of 0.360, showing that annual GDP growth does not have a statistically significant effect on government healthcare expenditure within the sampled countries. Similarly, population was found to be statistically insignificant (p=0.114), suggesting that differences in population size alone do not significantly explain variations in government healthcare expenditure after controlling for country-specific effects.

Life expectancy has a coefficient of -0.002 and is statistically significant at the 10% level (p=0.080). This suggests that a one-unit increase in life expectancy is associated with a 0.002-unit decrease in government healthcare expenditure, holding other factors constant. Although statistically significant, the magnitude of the effect is relatively small. One possible explanation is that countries with higher life expectancy generally experience better overall health outcomes and improved healthcare systems, thereby reducing the need for additional government healthcare expenditure.

Overall, the model explains approximately 45.9% of the variation in domestic general government healthcare expenditure (R^2 = 0.459). The regression was estimated using 190 observations, with a mean dependent variable of 70.775 and a standard deviation of 160.339.

DISCUSSION

The study examined the impact of out-of-pocket healthcare expenditure on domestic general government healthcare expenditure across the SAARC Countries while controlling for GDP Growth, population and life expectancy. The findings indicate that out-of-pocket expenditure has a statistically significant negative effect on government healthcare expenditure, whereas GDP growth and population do not significantly influence public healthcare spending. Life expectancy also showed a statistically significant negative relationship with government healthcare expenditure, although the effect size was relatively small. These findings suggest that healthcare financing patterns in South Asia are assured more by the structure of healthcare systems than by macroeconomic or demographic factors alone.

The significant negative relationship between out-of-pocket expenditure and government healthcare expenditure suggests that as households finance a larger proportion of healthcare costs directly, governments tend to contribute a smaller share of healthcare expenditure. This finding reflects the healthcare financing structure observed across the SAARC countries, where limited public healthcare funding often shifts the financial burden onto households. Countries such as Afghanistan, Bangladesh and Pakistan consistently report high levels of out-of-pocket expenditure alongside comparatively low levels of government healthcare spending. In contrast, countries such as the Maldives and Bhutan demonstrate greater public healthcare investment and lower dependence on direct household payments. This pattern supports the inverse relationship identified by the regression model. Similar findings were reported by Ahmed et al., who concluded that increased government healthcare expenditure reduces households' reliance on out-of-pocket payments and strengthens financial protection, particularly in developing and fragile states. Likewise, evidence suggests that strengthening publicly financed healthcare systems improves financial risk protection and reduces catastrophic health expenditure among households (Rajalakshmi et al., 2023). However, some studies argue that increasing government expenditure alone is insufficient if healthcare systems remain inefficient or resources are poorly allocated, highlighting the need to address both the quantity and the efficiency of public healthcare outcomes (Ge et al., 2024).

GDP growth and population were found to have no statistically significant effect on government healthcare expenditure. Although economic growth generally increases government revenue, additional resources are not necessarily allocated to healthcare, particularly in developing economies where governments face competing priorities such as education, infrastructure, and debt repayment (Schieber et al., 2015). Consequently, economic expansion does not automatically translate into greater public healthcare investment. Similarly, while larger populations increase demand for healthcare services, population size alone does not determine healthcare expenditure, as fiscal capacity, healthcare policies, and institutional effectiveness also influence government spending. Previous studies have similarly reported that healthcare expenditure depends more on governance quality and policy priorities than on

economic growth or population size alone (Beylik et al., 2022). In contrast, other researchers have found GDP growth and population to be significant determinants of healthcare expenditure, suggesting that differences in country coverage, study period, and econometric methodology may explain the contrasting findings (Yang, 2020).

Life expectancy demonstrated a statistically significant negative relationship with government healthcare expenditure, although the estimated effect was relatively small. One possible explanation is that countries with higher life expectancy often experience improved health outcomes through stronger preventive healthcare, better sanitation, increased education and healthier lifestyles, reducing the need for substantial increases in government healthcare expenditure. Previous research has similarly shown that improvements in population health are associated with broader socioeconomic development rather than healthcare expenditure alone. Nevertheless, several studies have reported a positive relationship between life expectancy and healthcare expenditure, arguing that ageing populations require greater investment in long-term care and chronic disease management. These contrasting findings indicate that the relationship between life expectancy and healthcare expenditure varies with demographic characteristics, healthcare financing structures, and levels of economic development.

Overall, the findings indicate that healthcare financing remains one of the most important determinants of government healthcare expenditure across the SAARC region. The significant influence of out-of-pocket expenditure highlights the ongoing financial burden on households and emphasises the need to strengthen publicly financed healthcare systems. Expanding government investment, improving the efficiency of healthcare expenditure, and reducing reliance on direct household payments would contribute to greater financial protection and support progress towards Universal Health Coverage. Although GDP growth and population were not significant predictors in this study, they remain important contextual factors that may indirectly influence healthcare expenditure through fiscal policy governance and long-term economic development.

CONCLUSION

Healthcare expenditure is critical for improving population health and promoting sustainable development, particularly in developing countries with limited public resources. This study examined the impact of out-of-pocket healthcare expenditure on domestic general government healthcare expenditure across the SAARC countries, while controlling for GDP growth, population and life expectancy. Panel data were analysed using Stata from 2000 to 2024 across the SAARC Region, comprising 8 countries. Correlation analysis and the Variance Inflation Factor (VIF) confirmed the absence of multicollinearity. The Hausman test indicated that the Fixed Effects Model was appropriate, while the Woolridge and Modified Wald tests identified heteroskedasticity but no autocorrelation. Therefore, a Fixed Effects model with robust standard errors was used. The results show that out-of-pocket expenditure has a significant negative effect on government healthcare expenditure at a 10 percent significance level. Life expectancy also showed a significant negative relationship, whereas GDP growth and population were not statistically

significant. These findings suggest that healthcare financing structures have a greater influence on government healthcare expenditure than broader economic or demographic factors.

The study highlights the importance of increasing public healthcare investment, improving spending efficiency and reducing reliance on out-of-pocket payments to strengthen financial protection and support Universal Health Coverage within SAARC countries. The findings suggest that the structures of healthcare financing play an important role in determining government healthcare expenditure across SAARC countries. The negative relationship between out-of-pocket expenditure and government healthcare suggests that limited public financing can shift a greater share of healthcare costs onto households. This is relevant to South Asia as many countries continue to rely heavily on direct household payments for healthcare. This insignificant effect of GDP growth indicates that economic growth necessarily does not translate into greater healthcare spending, as governments may prioritise other areas of expenditure. Similarly, population size alone may not determine healthcare expenditure, as spending also depends on healthcare needs, fiscal capacity and government priorities. The negative relationship with life expectancy may reflect the role of preventive healthcare and broader socioeconomic development in improving health outcomes without proportionate increases in government expenditure. Hence, the results emphasise that the structure and allocation of healthcare financing may be more important than economic or demographic factors alone. Overall, the findings contribute to understanding healthcare financing in South Asia and provide evidence to support future healthcare policy decisions.

Policy Implications

Based on the findings of this study, following policies are recommended.

- Increase public healthcare spending: SAARC governments can direct greater public expenditure towards healthcare centres, vaccination programmes, maternal and child healthcare, preventive screening and essential medicines. This is even more important to do in rural and underserved regions. Greater investment at the primary-care level can reduce reliance on expensive private treatment and, consequently, lower households' out-of-pocket expenditure.

- Expand health insurance coverage: Governments should expand national health insurance programmes, particularly for low-income and vulnerable households. Public subsidies could cover insurance premiums for households unable to afford them, while essential hospitalisation, medicines and primary healthcare services could be included within benefit packages. This could pool healthcare costs across the population rather than having individuals pay directly for treatment, thereby reducing the risk of financial hardship.

- Improve spending efficiency: Increasing spending alone may not improve healthcare outcomes if resources are allocated inefficiently. Governments should prioritise funding for preventive services, essential medicines and rural healthcare infrastructure rather than concentrating resources primarily in expensive urban hospitals.

- Strengthen SAARC Collaboration: SAARC Countries could establish joint disease-surveillance systems, regional medicine-procurement programmes and shared healthcare databases. Joint procurement of essential medicines and vaccines could increase governments' bargaining power and reduce costs, while a regional surveillance network could enable countries to share information on emerging diseases. SAARC could also establish regular knowledge-sharing programmes through which countries exchange successful approaches to health insurance, primary healthcare and digital health systems

Limitations

Despite the useful insights of this research, there still remain some gaps. Firstly, the study uses only countries within the same region (SAARC), limiting the sample and reducing the generalisability of these findings. Future studies could include a larger sample of countries from different regions or compare developing and developed economies to improve generalisability of the findings and enable broader cross-country comparisons. Secondly, the variables were limited. Other determinants, such as health insurance coverage, governance quality and healthcare infrastructure, were excluded due to data limitations. Researchers in the future could incorporate additional variables, such as health insurance coverage, government revenue, healthcare infrastructure, age dependency ratio and governance quality, to provide a more comprehensive analysis of the determinants of government healthcare expenditure. Finally, the lack of country-specific variables is a limitation. The regression model does not account for country-specific healthcare policies, political priorities, or institutional reforms that may significantly influence government healthcare expenditure. These factors vary across the SAARC countries and are difficult to quantify using secondary data.

REFERENCES

Ahmed, S. (2025). *Government Health Spending to Reduce Out-of-pocket (OOP) Expenditure: Experience from Fragile States Compared to Non-fragile States*. https://doi.org/10.2139/ssrn.5337324

Alin, A. (2010). Multicollinearity. *Wiley Interdisciplinary Reviews: Computational Statistics*, *2*(3), 370–374. https://doi.org/10.1002/wics.84

Baltagi, B. H. (2014). Hausman-Test - An Overview | ScienceDirect Topics. In *www.sciencedirect.com*. https://www.sciencedirect.com/topics/social-sciences/hausman-test

Behera, D. K., & Dash, U. (2019). Impact of macro-fiscal determinants on health financing: empirical evidence from low-and middle-income countries. *Global Health Research and Policy*, *4*(1). https://doi.org/10.1186/s41256-019-0112-4

Beylik, U., Cirakli, U., Cetin, M., Ecevit, E., & Senol, O. (2022). The Relationship Between Health Expenditure Indicators and Economic Growth in OECD Countries: A Driscoll-Kraay Approach. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.1050550

Bhat, R., & Jain, N. (2006a). Analysis of Public and Private Healthcare Expenditures. *Economic and Political Weekly*, *41*(1), 57–68. https://www.jstor.org/stable/4417643

Bhat, R., & Jain, N. (2006b). Analysis of Public and Private Healthcare Expenditures. *Economic and Political Weekly*, *41*(1), 57–68. https://www.jstor.org/stable/4417643

Bhojani, U., Thriveni, B., Devadasan, R., Munegowda, C., Devadasan, N., Kolsteren, P., & Criel, B. (2012). Out-of-pocket healthcare payments on chronic conditions impoverish urban poor in Bangalore, India. *BMC Public Health*, *12*, 990. https://doi.org/10.1186/1471-2458-12-990

Billig, J. I., Law, J. M., Brody, M., Cavanaugh, K. E., & Dy, C. J. (2023). Catastrophic health expenditures associated with open reduction internal fixation of distal radius fractures. *The Journal of Hand Surgery*, *48*(10), 977–983. https://doi.org/10.1016/j.jhsa.2023.06.009

Chandra, Y., & Bhoomadevi, A. (2026). Convergence in Government Health Expenditure Among SAARC Nations. *Discover Public Health*, *23*(1). https://doi.org/10.1186/s12982-026-01566-1

Das, T. (2024). Role of public health expenditure on health infrastructure and manpower in India: A state-level analysis of the nexus between indicators. *Indian Journal of Human Development*, *18*(2), 242–266. https://doi.org/10.1177/097370302412992644

Financial hardship and out-of-pocket expenditure: Health at a Glance 2025. (2025). In *OECD*. https://www.oecd.org/en/publications/health-at-a-glance-2025_8f9e3f98-en/full-report/financial-hardship-and-out-of-pocket-expenditure_4160e6d2.html

Financial Protection. (n.d.). In *www.who.int*. Retrieved July 31, 2026, from https://www.who.int/health-topics/financial-protection#tab=tab_1

Ge, Z., Cai, J., & Hu, J. (2024). What drives China's healthcare expenditure? A theoretical and empirical study of determinants and trends. *Frontiers in Public Health*, *12*. https://doi.org/10.3389/fpubh.2024.1445912

Health at a Glance 2023: Financial Hardship and Out-of-Pocket Expenditure. (2023). In *OECD*. https://www.oecd.org/en/publications/2023/11/health-at-a-glance-2023_e04f8239/full-report/financial-hardship-and-out-of-pocket-expenditure_01896d0f.html

Huq, M. S., Acharya, S. C., Poudyal, S., Sharma, S., Silwal, S. R., Sapkota, S., Gautam, M., Haque, M. M., Uddin, A. F. M. K., Gunasekara, S., Babu, K. G., Tshomo, U., Safi, A. J., Masood, A. I., Sumon, M. A., Purvin, S., Hai, M. A., Skinner, H. D., Avery, S., … Wijesooriya, K. (2024). Cancer care and outreach in the South Asian Association for Regional Cooperation (SAARC) region: Overcoming barriers and addressing challenges. *The Lancet. Oncology*, *25*(12), e650–e662. https://doi.org/10.1016/S1470-2045(24)00514-X

Jakovljevic, M., Timofeyev, Y., Ranabhat, C. L., Fernandes, P. O., Teixeira, J. P., Rancic, N., & Reshetnikov, V. (2020). Real GDP growth rates and healthcare spending – comparison between the G7 and the EM7 countries. *Globalization and Health*, *16*(1). https://doi.org/10.1186/s12992-020-00590-3

Jasarevic, T. (2019). Countries are spending more on health, but people are still paying too much out of their own pockets. In *www.who.int*. https://www.who.int/news/item/20-02-2019-countries-are-spending-more-on-health-but-people-are-still-paying-too-much-out-of-their-own-pockets

Jose, J. (2022). Introduction to Time Series Analysis and Its Applications. In *ResearchGate*. https://www.researchgate.net/publication/362389180_INTRODUCTION_TO_TIME_SERIES_ANALYSIS_AND_ITS_APPLICATIONS

Kaiser, A. H., Rotigliano, N., Flessa, S., Ekman, B., & Sundewall, J. (2023). Extending Universal Health Coverage to Informal Workers: A Systematic Review of Health Financing Schemes in Low- and Middle-Income Countries in Southeast Asia. *PLOS ONE*, *18*(7), e0288269. https://doi.org/10.1371/journal.pone.0288269

Kaladharan, S., & Manayath, D. (2024). Out-of-pocket healthcare expenditure in emerging economies: Evidence from panel data analysis. *The Journal of Medicine Access*, *8*, 27550834241262108. https://doi.org/10.1177/27550834241262108

Kanters, S. (2022). Fixed- and Random-Effects Models. *Methods in Molecular Biology (Clifton, N.J.)*, *2345*, 41–65. https://doi.org/10.1007/978-1-0716-1566-9_3

Lee, J. T., Hamid, F., Pati, S., Atun, R., & Millett, C. (2015). Impact of noncommunicable disease multimorbidity on healthcare utilisation and out-of-pocket expenditures in middle-income countries: cross-sectional analysis. *PLOS ONE*, *10*(7), e0127199. https://doi.org/10.1371/journal.pone.0127199

Lütkepohl, H., & Burda, M. M. (1997). Modified Wald tests under nonregular conditions. *Journal of Econometrics*, *78*(1), 315–332. https://doi.org/10.1016/s0304-4076(97)80015-2

Malhotra, C., & Do, Y. K. (2016). Public Health Expenditure and Health System Responsiveness for Low-Income Individuals: Results from 63 Countries. *Health Policy and Planning*, *32*(3), 314–319. https://academic.oup.com/heapol/article/32/3/314/2555440?guestAccessKey=

McCarthy, R. V., McCarthy, M. M., Ceccucci, W., & Halawi, L. (2019). What Do Descriptive Statistics Tell Us? *Applying Predictive Analytics*, 57–87. https://doi.org/10.1007/978-3-030-14038-0_3

Molla, A. A., Chi, C., & Mondaca, A. L. N. (2017). Predictors of high out-of-pocket healthcare expenditure: An analysis using Bangladesh Household Income and Expenditure Survey, 2010. *BMC Health Services Research*, *17*(1). https://doi.org/10.1186/s12913-017-2047-0

Nandi, S., Schneider, H., & Dixit, P. (2017). Hospital utilization and out of pocket expenditure in public and private sectors under the universal government health insurance scheme in Chhattisgarh State, India: Lessons for universal health coverage. *PLOS ONE*, *12*(11), e0187904. https://doi.org/10.1371/journal.pone.0187904

Nayak, P. R., Oswal, K., Pramesh, C. S., Ranganathan, P., Caduff, C., Sullivan, R., Advani, S., Kataria, I., Kalkonde, Y., Mohan, P., Jain, Y., & Purushotham, A. (2022). Informal Providers-Ground Realities in South Asian Association for Regional Cooperation Nations: Toward Better Cancer Primary Care: A Narrative Review. *JCO Global Oncology*, *8*, e2200260. https://doi.org/10.1200/GO.22.00260

Nguyen, C. M., Nguyen, M. P., & Luc, L. D. P. (2023). How Public Health Insurance Expansion Affects Healthcare Utilizations in Middle and Low-Income Households: An Observational Study from National Cross-Section Surveys in Vietnam. *BMC Public Health*, *23*(1). https://doi.org/10.1186/s12889-023-15500-6

O'Brien, R. M. (2007). A Caution Regarding Rules of Thumb for Variance Inflation Factors. *Quality & Quantity*, *41*(5), 673–690. https://doi.org/10.1007/s11135-006-9018-6

OECD. (2025). Health at a Glance 2025: OECD Indicators. *Health at a Glance*, *2025*. https://www.oecd.org/en/publications/2025/11/health-at-a-glance-2025_a894f72e.html?

Office. (2025). How does population ageing affect health system financial sustainability and affordable access to health care in Europe? In *Who.int*. World Health Organization. https://www.who.int/europe/publications/i/item/9789289061810

Olsen, C., & George, D. M. M. St. (2004). *Cross-sectional study design and data analysis*. http://www.yes-competition.org/media.collegeboard.com/digitalServices/pdf/yes/4297_MODULE_05.pdf

Rajalakshmi, E., Sasidharan, A., Bagepally, B. S., Kumar, M. S., Manickam, P., Selva Vinayagam, T. S., Sampath, P., & Parthipan, K. (2023). Household catastrophic health expenditure for COVID-19 during March-August 2021, in South India: a cross-sectional study. *BMC Public Health*, *23*(1). https://doi.org/10.1186/s12889-022-14928-6

Rajan, S., Rathod, S. D., Luitel, N. P., Murphy, A., Roberts, T., & Jordans, M. J. D. (2020). Healthcare utilization and out-of-pocket expenditures associated with depression in adults: A cross-sectional analysis in Nepal. *BMC Health Services Research*, *20*(1). https://doi.org/10.1186/s12913-020-05094-9

Reinhardt, U. E. (2003). Does the Aging of the Population Really Drive the Demand for Health Care? *Health Affairs*, *22*(6), 27–39. https://doi.org/10.1377/hlthaff.22.6.27

Roy, K., & Howard, D. H. (2007). Equity in out-of-pocket payments for hospital care: Evidence from India. *Health Policy*, *80*(2), 297–307. https://doi.org/10.1016/j.healthpol.2006.03.012

Saleem, A., Cheema, A. R., Rahman, A., Ali, Z., & Parkash, R. (2021). Do Health Infrastructure and Services, Aging, and Environmental Quality Influence Public Health Expenditures? Empirical Evidence from Pakistan. *Social Work in Public Health*, *36*(6), 688–706. https://doi.org/10.1080/19371918.2021.1920540

Schieber, G., Cristian Baeza, K., D., & Maier, M. (2015). Financing health systems in the 21st century. In *Nih.gov*. The International Bank for Reconstruction and Development / The World Bank. https://www.ncbi.nlm.nih.gov/books/NBK11772/

Schieber, G., & Maeda, A. (1999). Health care financing and delivery in developing countries. *Health Affairs*, *18*(3), 193–205. https://doi.org/10.1377/hlthaff.18.3.193

Schneider, M. T., Chang, A. Y., Crosby, S. W., Gloyd, S., Harle, A. C., Lim, S., Lozano, R., Micah, A. E., Tsakalos, G., Su, Y., Murray, C. J. L., & Dieleman, J. L. (2021). Trends and Outcomes in Primary Health Care Expenditures in Low-Income and Middle-Income Countries, 2000–2017. *BMJ Global Health*, *6*(8), e005798. https://doi.org/10.1136/bmjgh-2021-005798

Sengupta, A., Mukhopadhyaya, I., Weerasinghe, M. C., & Karki, A. (2017). The Rise of Private Medicine in South Asia. *BMJ*, j1482. https://doi.org/10.1136/bmj.j1482

Shashwati Pankaj, Arya Karun, Jignesh Bhate, & Guruprasad Rao KS. (2024a). Enhancing healthcare decision-making: Comparison between health technology assessments and access to medical care in a high-income country vs. low/middle income countries. *Health Technology Assessment in Action*. https://doi.org/10.18502/htaa.v8i2.15632

Shashwati Pankaj, Arya Karun, Jignesh Bhate, & Guruprasad Rao KS. (2024b). Enhancing healthcare decision-making: Comparison between health technology assessments and access to medical care in a high-income country vs low/middle income countries. *Health Technology Assessment in Action*. https://doi.org/10.18502/htaa.v8i2.15632

Sisira Kumara, A., & Samaratunge, R. (2019). relationship between healthcare utilization and household out-of-pocket healthcare expenditure: Evidence from an emerging economy with a free healthcare policy. *Social Science & Medicine*, *235*, 112364. https://doi.org/10.1016/j.socscimed.2019.112364

Sofi, S. A., & Yasmin, E. (2024). Out-of-pocket health expenditure and associated factors: Insights from National Health Accounts (NHA) using panel data analysis. *INQUIRY The Journal of Health Care Organization Provision and Financing*, *61*. https://doi.org/10.1177/00469580241309903

South Asian Health: What Is to Be Done? (2004). *BMJ*, *328*(7443), 837.2. https://doi.org/10.1136/bmj.328.7443.837-a

Sriram, S., & Khan, M. M. (2020). Effect of health insurance program for the poor on out-of-pocket inpatient care cost in India: Evidence from a nationally representative cross-sectional survey. *BMC Health Services Research*, *20*(1). https://doi.org/10.1186/s12913-020-05692-7

Tilburg Science Hub. (2020). In *Tilburgsciencehub.com*. https://www.tilburgsciencehub.com/topics/analyze/tests/tests-assumptions/serial-correlation/

Woolf, S. H., & Schoomaker, H. (2019). Life Expectancy and Mortality Rates in the United States, 1959-2017. *JAMA*, *322*(20), 1996–2016. https://doi.org/10.1001/jama.2019.16932

World Health Organization. (2025a). Universal Health Coverage (UHC). In *World Health Organization*. https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)

World Health Organization. (2025b). Universal Health Coverage (UHC). In *World Health Organization*. https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc)

World Health Organization: WHO. (2019, February 20). *Countries are spending more on health, but people are still paying too much out of their own pockets*. World Health Organization: WHO.Who.Int. https://www.who.int/news/item/20-02-2019-countries-are-spending-more-on-health-but-people-are-still-paying-too-much-out-of-their-own-pockets?

Yang, X. (2020). Health Expenditure, Human Capital, and Economic Growth: An Empirical Study of Developing Countries. *International Journal of Health Economics and Management*, *20*(2), 163–176. JSTOR. https://doi.org/10.2307/45295492

Yaser Mohammed Al-Worafi. (2023). Healthcare facilities in developing countries: economics-related issues. *Springer eBooks*, 1–19. https://doi.org/10.1007/978-3-030-74786-2_210-1

Zamore, S. (2022). Panel data analysis: A simplified summary. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4307599