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IMPACT OF HEALTH EXPENDITURES ON SOCIAL WELFARE AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES

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ABSTRACT
The paper examines the impacts of social and economic growth in 81 developing nations, as influenced by public and private health expenditure. It is estimated that increased investment in health accelerates GDP growth and improves well-being, as indicated by the Human Development Index (HDI). It analyses annual data from 2000 to 2024 and estimates two dynamic panel models: the economic growth model and the social welfare model. To control endogeneity, reverse causality, unobserved heterogeneity and cross-country dependence, the System Generalised Method of Moments (System GMM) is used. The models include significant demographic and economic controls, including fertility, unemployment, labour force growth, and gross fixed capital formation. The effect of the public health expenditure on economic growth and social welfare is high and effective. The other effect of private health expenditure is that it raises welfare and affects GDP growth, albeit negatively, but positively. The expansion of the labour force and capital formation also promote development, whereas high fertility and unemployment inhibit it. Diagnostic tests ensure the validity and robustness of GMM estimators. Based on the results, it is important to note that sustained and properly directed investment in health systems can help bolster productivity, improve living standards, and contribute to long-term growth in resource-blinking economies. This paper provides a combined dynamic model in which health expenditure is analysed alongside economic and social welfare. It provides current evidence from a large sample of developing nations and adds to the policy discussion on the importance of health investment in inclusive development.
Keywords: *Health expenditure; Economic growth; Social welfare; System GMM; Developing countries; Human capital*
JEL Classifications: *I15; O47; C33; I32*

1. INTRODUCTION

Economic and social development heavily relies on health. A healthier population acquires skills more efficiently, becomes more actively involved in the labour market, and contributes to improvements in long-term productivity (Grossman, 1972; Mushkin, 1962). On the other hand, low-quality health systems amplify morbidity, absenteeism, and avoidable mortality, thereby curtailing overall productivity and exacerbating inequality (Novignon et al., 2012; Akram and Khan, 2007). These dynamics highlight the need for adequate health investment, particularly in developing economies.

The increasing population pressure, limited fiscal capacity, and structural deficiencies in the infrastructure of developing nations make it vital to efficiently manage health financing (Rahim and Muzaffar, 2024). Public spending inhibits access to preventive and necessary services (Rahman et al., 2025), whereas the lack of government provision is usually compensated for by private spending (Khan & Idrees, 2025). Collectively, such expenses determine life expectancy, labour productivity, and overall human capital formation (Jiang et al., 2024). With high fertility and unemployment, the gains of health investment may be undermined by economic and social performance (Ashraf et al., 2013; Habees and Rumman, 2012).

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The role of health expenditure is well known; however, the combined effects on economic growth and social welfare are not well researched. The available literature is mostly growth-related (Bedir, 2016; Rengin, 2012) or HDI-based well-being (Van den Bergh and Botzen, 2018) without concentrating on how the two relate to each other. In addition, the reliability of the previous results is diminished by methodological constraints, specifically endogeneity between health, income, fertility, and labour markets (Baltagi, 2024).

Despite increased attention to the relationships between health spending and development, the current literature has some gaps. First, few empirical analyses examine economic growth and social welfare simultaneously, although both are influenced by investment in health. Second, influential demographic variables (fertility and unemployment rates, etc.) are often ignored, which reduces the likelihood of elucidating the effects of population dynamics on these associations (Paudel et al., 2025). Third, most existing literature is based on static models, which do not account for the feedback and adjustment processes that occur as countries continue to invest in health and develop over time (Luci-Greulich and Thévenon, 2013). These gaps indicate that a broader, more dynamic approach should be pursued.

This paper is important as it examines the effect of public and private health expenditure on the economic development and social welfare of 81 developing countries from 2000 to 2024. It covers endogeneity, unobserved heterogeneity and cross-country dependence using the System GMM estimator (Arellano and Bond, 1991; Blundell and Bond, 2000). The article considers both economic and demographic factors to provide a more detailed understanding of how health investment influences development outcomes (Rahim & Muzaffar, 2024; Jiang et al., 2024).

The research examines health expenditure and its impact on the economic and social performance of developing countries. It evaluates the contribution of public and private health spending to GDP growth and the enhancement of health investment to social welfare, using the Human Development Index (HDI) as the major proxy. On these aims, this research hypothesises three assumptions that are: (1) the positive effect of public and private health expenditures on the growth of GDP; (2) higher health spending increases social welfare through better life expectancy, education and income and (3) the overall effect of health spending is moderated by demographic and economic factors with high fertility diluting it but labour force growth and capital formation enhancing it.

2. LITERATURE REVIEW

Findings on health spending, growth, and welfare have passed through many theoretical and empirical steps. This section will list the top contributions chronologically and identify the gaps that will lead to the proposed study.

Initial research put health as one of the main indicators of human capital. Mushkin (1962) and Grossman (1972) believed that improved health would lead to less absenteeism, longer working years, and higher lifetime earnings. Future additions emphasised the relationship between life expectancy, reduced disease burden, and long-term growth (Rengin, 2012; Bedir, 2016). Through these pillars, it has been proven that health investment not only improves economic performance in terms of medical outcomes but also enhances human capital accumulation.

Research was then broadened to encompass indicators of well-being beyond the Human Development Index. It is indicated that spending on health enhances life expectancy, both education and living standard (Van den Bergh & Botzen, 2018). It has recently been shown that greater health investment is associated with lower social vulnerability and resilience (Jansen et al.,

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2024). Most studies, however, separate economic growth and welfare, inhibiting combined insights into policies despite these findings.

Urban health expenditures promote equity and accessibility by increasing preventive/essential care (Akram and Khan, 2007; Novignon et al., 2012). Developing economies have been growing rapidly in private health expenditure. On the one hand, it can enhance service quality, but on the other hand, it is likely to increase inequality and financial risk (Khan and Idrees, 2025). The recent literature indicates that the direct positive effect of private expenditure is that households can experience improved or faster services (Mumtaz and Sumarto, 2025). The impact of public versus private expenditure is a controversial question.

Having high fertility decreases investment per child and the rate of developing human capital (Ashraf et al., 2013; Luci-Greulich and Thévenon, 2013). The productivity gain in terms of improved health may be undermined by unemployment (Habees & Rumman, 2012). Conversely, capital formation and an increase in labour force enhance the advantages of health spending by increasing productive power (Ongo et al., 2014; Mandiefe and Chupezi, 2015). Recent evidence indicates that the demographic transition has a major bearing on economic and welfare outcomes (Paudel et al., 2025).

Standard approaches like OLS and fixed effects are weak in addressing endogeneity and reverse causality. Dynamism panel estimators, such as the difference GMM (Anderson and Hsiao, 1981; Arellano and Bond, 1991) and the System GMM (Blundell and Bond, 2000), provide superior estimates. Research based on such procedures reveals strong interrelationships among health, growth, fertility, and welfare (Jiang et al., 2024; Rahim and Muzaffar, 2024). Nevertheless, only a limited number of analyses use these tools to investigate both economic and welfare.

Recent research shows that productivity increases with health spending, along with resilience and long-term well-being (Rahman et al., 2025; Jansen et al., 2024). Development is one variable affected by public and private expenditures (Khan and Idrees, 2025). Nevertheless, the majority of recent studies still focus on the numerical analysis of growth or welfare individually rather than in an integrated system.

The literature demonstrates that health expenditure improves population health and, subsequently, increases productivity, enhances human capital, and raises total welfare. The effects, however, depend on the broader demographic and economic environment, including fertility, employment, labour force growth, and capital formation. Despite the significant effort invested in this direction, several gaps remain. Few studies examine the two concepts of economic growth and social welfare, and most do not account for the crucial demographics that determine the effects of health expenditure. Most current studies also rely on static approaches, which cannot capture dynamic interactions or relaxation. Lastly, there is still insufficient evidence on a large-scale basis covering the long run from 2000 to 2024, which could be further analysed and updated.

3. METHODOLOGY

The two principal dependent variables in the study are economic development, measured as the year-end percentage change in real GDP (GDPG), and social welfare, measured by the Human Development Index (HDI), to capture joint improvements in life expectancy, education, and income. The explanatory variables are the core variables comprising the public health expenditure (PUHE) and the private health expenditure (PRHE), measured in terms of percentage of GDP, and a set of demographic and economic controls. The set of controls consists of gross fixed capital formation (GFC), the unemployment rate (UR), labour force growth (LFG), and the fertility rate (FR), all chosen for their accepted influence on

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development outcomes. All these variables provide a holistic picture of the interaction between health spending and the overall levels of economic and demographic variables in developing countries.

The research approximates two background approaches to examine the effects of health expenditure on economic and social outcomes: the economic growth model and the social welfare model. The model of economic growth connects the growth of GDP (GDPG) with the public health expenditure (PUHE), the private health expenditure (PRHE), the gross fixed capital formation (GFC), the growth of the labour force (LFG), the fertility rate (FR), and unemployment (UR). The social welfare model uses the same group of explicative variables for the Human Development Index (SW). To explain persistence and dynamic adjustment, both models use lagged dependent variables, so that historical levels of GDP growth and social welfare can affect current performance. This dynamic formulation includes all explanatory variables in X, along with lagged terms that capture the dynamic changes in growth and welfare over time. Because lagged dependent variables introduce endogeneity, standard OLS and fixed-effects estimators are biased and inconsistent, so a dynamic panel should be employed.

Model A: Economic Growth (Static)

$$GDPG_{it} = \alpha_0 + \alpha_1 PUHE_{it} + \alpha_2 PRHE_{it} + \alpha_3 GFC_{it} + \alpha_4 LFG_{it} + \alpha_5 FR_{it} + \alpha_6 UR_{it} + \varepsilon_{it} \quad (1)$$

Model A: Economic Growth (Dynamic)

$$GDPG_{it} = \gamma\, GDPG_{i,t-1} + X_{it}\delta + u_{it} \quad (2)$$

Model B: Social Welfare (Static)

$$SW_{it} = \beta_0 + \beta_1 PUHE_{it} + \beta_2 PRHE_{it} + \beta_3 GFC_{it} + \beta_4 LFG_{it} + \beta_5 FR_{it} + \beta_6 UR_{it} + \eta_{it}(2) \quad (3)$$

Model B: Social Welfare (Dynamic)

$$SW_{it} = \theta\, SW_{i,t-1} + X_{it}\lambda + v_{it} \quad (4)$$

To elicit persistence and dynamic adaptation in economic growth and social welfare, the models incorporate lagged dependent variables, allowing past performance to affect current performance. X will denote the entire set of explanatory variables in the model. However, the presence of lagged outcomes introduces endogeneity because the lagged dependent variable is correlated with the error term. As a result, conventional estimators such as OLS and fixed effects become biased and inconsistent, reinforcing the need for a dynamic panel approach that can properly address these issues.

The study applies the System Generalised Method of Moments (System GMM) developed by Arellano and Bond (1991) and Blundell and Bond (2000), as it is well-suited for analysing dynamic panel data relationships. Health, income, fertility, and welfare evolve gradually, creating inherent persistence that requires a dynamic estimator. At the same time, endogeneity is expected because income influences health spending, and improved health feeds back into economic performance. System GMM also controls for unobserved country-specific factors such as institutional quality and structural differences, while accommodating the large cross-section (N=81) and moderate time span (T=25). The estimator helps address simultaneity and reverse causality, and the instrument matrix is collapsed to prevent instrument proliferation. Several diagnostic tests support the validity of the estimates, including AR(1) and AR(2) tests for serial correlation, Sargan and Hansen tests for over-identifying restrictions, and Pesaran CD and LM tests for cross-sectional dependence. All estimations were conducted using Stata

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(xtabond2) and EViews 14. The existing methods, such as OLS, fixed effects, pooled models, ARDL, or SEM, fail to fully address endogeneity, unobserved heterogeneity, or dynamic feedback. System GMM will thus offer the best and most stable method for assessing the role of health spending in long-term economic growth and social welfare.

4. RESULTS

The descriptive statistics provide a picture of the key variables used in the analysis. Table 1 highlights the mean, minimum and maximum values, standard deviation, and skewness of the 81 developing countries in the sample during 2000 and 2024.

Table 1. Descriptive Statistics

Variable	Mean	Max	Min	Std. Dev.	Skewness
GDPG	4.56	10.30	–6.55	2.82	–0.69
GFC (% GDP)	26.28	55.36	9.73	9.93	0.67
HDI (SW)	0.60	0.92	0.23	0.14	–0.08
LFG	2.09	6.19	–2.44	1.51	–0.56
PRHE	2.97	9.20	0.14	1.51	0.95
PUHE	9.81	17.53	2.44	3.47	0.00
UR	8.73	31.33	0.10	6.98	1.44
FR	3.43	7.33	1.43	1.48	0.38

Note: *N = 81 countries; T = 25 years.*

The average growth rate of GDP is 4.56% over the period, but development across countries is highly variable, making it hard to identify a consistent trend. There is a wide range of HDI values from 0.23 to 0.92, and considerable inequality in welfare. Fertility and unemployment have highly positive skewness, indicating that a few countries are experiencing abnormally high demographic and labour-market stresses. These trends are among the reasons why dynamic and robust estimation procedures should be applied to address the underlying heterogeneity.

Table 2. Correlation Matrix

Variables	GDPG	GFC	SW	LFG	PRHE	PUHE	UR	FR
GDPG	1.000							
GFC	0.242*	1.000						
SW	0.024	0.398*	1.000					
LFG	0.043	–0.120*	0.316*	1.000				
PRHE	0.032	–0.132*	0.137*	–0.004	1.000			
PUHE	0.061*	–0.029	0.049**	–0.004	–0.015	1.000		
UR	–0.089*	–0.044	–0.083*	–0.073*	–0.051*	0.202*	1.000	
FR	–0.036	–0.375*	–0.820*	0.380*	0.105*	–0.024	–0.070*	1.000

Note: *Significant at 5%; **Significant at 10%.

There is a positive relationship between GDP growth and capital formation, a link between social welfare and fertility, and a strongly negative relationship between social welfare and health expenditure. The preceding relationships underscore the importance of a multivariate dynamic model for explaining the interrelationships among economic, demographic, and health-related variables.

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Table 3. Cross-Sectional Dependence Tests

Test	Statistic (Model A)	Prob.	Statistic (Model B)	Prob.
Breusch–Pagan LM	4633.79	0.00	24,550.88	0.00
Pesaran Scaled LM	16.30	0.00	263.73	0.00
Pesaran CD	18.27	0.00	58.67	0.00

Note: *The Breusch–Pagan LM, Pesaran Scaled LM, and Pesaran CD tests all return statistically significant results ($p < 0.01$), confirming cross-sectional dependence among the 81 countries. This validates the use of System GMM, which is robust to correlated shocks across panel units.*

Each test is significant, indicating cross-sectional dependence. This implies that nations worldwide experience common shocks, such as financial crises, oil price changes, or pandemics. The fact that these results can be obtained using System GMM justifies its use to manage such dependence and dynamic feedback. Table 4 also shows the System GMM estimates of both models.

Table 4. System GMM Estimates

Variable	Coefficient (GDPG)	p-value	Coefficient (SW)	p-value
PUHE	0.008	0.002**	0.0014	0.000**
PRHE	0.015	0.089***	0.0005	0.032***
GFC	0.004	0.000**	0.00054	0.002**
LFG	0.150	0.000**	0.0070	0.001**
FR	–0.011	0.274	–0.0038	0.006**
UR	–0.003	0.304	–0.0007	0.158

The diagnostic checks support the reliability of the System GMM estimates. The AR(1) test is significant, as expected in first-differenced residuals, while the AR(2) test is not significant, indicating the absence of second-order serial correlation and confirming that the moment conditions are correctly specified. The Hansen and Sargan tests are also not significant, suggesting that the instruments used in the models are valid. Instrument counts remain within acceptable limits, 67 for the economic growth model and 37 for the social welfare model, avoiding the risk of overfitting. The final sample includes 81 countries, providing strong cross-country variation for estimating the dynamic relationships examined in the study.

The spending on catheterising the population contributes greatly to the growth of the GMO and the welfare of society. Workforce productivity and improved living conditions are achieved through stronger health systems, supported by vaccination, primary care, and healthcare infrastructure. It is also important to note that individual household health expenditure can positively affect welfare labelling, as the quality of services and access to care are directly related to household welfare.

Fertility is one of the major negative impacts on social welfare, which justifies the notion that the size of the family will undermine the investments in education and health. Unemployment has a negative but statistically non-significant influence, likely due to the high rate of informal employment in developing economies.

Both models show strong positive effects of capital formation and labour force growth. These findings demonstrate the relevance of health investment to broader economic and labour market development.

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The results are consistent with the traditional positions of Mushkin (1962) and Grossman (1972), who argued that health is a central element of human capital. The robust impact of government expenditure aligns with Akram and Khan (2007) and Rahman et al. (2025). The favourable contribution of the general expenditure is equal to the co-evidence of Khan and Idrees (2025).

The unfavourable association between fertility and unfavourable associations are supported by previous research by Ashraf et al. (2013) and Paudel et al. (2025).

The role of labour and capital formation aligns with Jansen et al. (2024) and Mandiefe and Chupezi (2015).

The results indicate that health expenditure is a valuable investment and a robust public health system, enhancing productivity and general well-being. It is significant to ensure a balanced approach to financing, in which the quality of services is improved through increased private-sector expenditures rather than through the elimination of governmental provision. Another finding is the significance of demographic influences: lower fertility enhances the welfare payoff of making health investments, and therefore, effective family planning, maternal health services, and the education of girls are required. Health spending can yield the greatest benefits when combined with job creation, skills building, and capital formation, which support the link between improved health and enhanced economic growth and performance. These lessons show that comprehensive development planning is required, with health considered a key to long-term development and social well-being.

5. CONCLUSION

This research paper examines the impact of public and private health spending on economic growth and social welfare across 81 developing nations between 2000 and 2024. By modelling endogeneity, persistence, and shared cross-country shocks using System GMM, the results indicate that health investment plays a central role in economic performance and human development. Government spending on welfare and on GDP growth has a strong, statistically significant effect on both welfare and GDP growth, which explains the need for continuous investment in preventive care, basic health services, and health infrastructure. Also within the category of positive influence is the role of private spending on health, especially its impact on welfare, with the direct benefits households would enjoy from timely, high-quality treatment. Other enhancements in development include capital training and labour force development, and high fertility is a key constraint.

The findings present guidelines on policy. Health expenditure must be treated as a productive investment, enhancing human capital and productivity and optimising general well-being. Making important services widely available and less reliant on out-of-pocket payments would enable countries to achieve more equal and sustainable outcomes. The health investment benefits can be enhanced by policies that reduce fertility through family planning, improve maternal health, and increase educational opportunities for women. The returns to better health systems can also be enhanced by complementary measures that foster capital formation and employment.

There are limitations associated with studying. HDI is an instrument that measures the overall welfare, but not the quality of services or efficiency of the health system. The use of national aggregates restricts the capacity to capture in-country differences. Although System GMM will reduce the main sources of endogeneity, internal instruments might not eliminate all reverse causality issues.

Further studies might include quality-of-care data, investigate nonlinear or threshold effects in health expenditure, and examine heterogeneity across income segments. Spatial models, country-specific case studies, or machine-learning models can provide more information on how the health

systems respond to institutional quality, inequality, and demographic transitions. Nevertheless, notwithstanding these shortcomings, the findings have gone a long way toward offering solid support for the view that well-funded, accessible health systems are a vital bedrock for long-term economic development and better social living in the developing world.

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