Health Investment as a Catalyst for Enterprise Development and Economic Growth

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Abstract: *The connection between the healthcare expenditure and the major health indicators, including the life expectancy and mortality rates, is complex (Van den Heuvel & Olaroiu, 2017). There are indicators of empirical evidence that suggests that higher levels of investment in healthcare are linked to better health conditions, including longer life expectancy and decreased mortality (Galvani-Townsend et al., 2022). Nevertheless, in low and middle-income countries (LMICs), funding of healthcare remains insufficient, which is a challenge to the health and economic growth of the population (WHO, 2020). This discussion examines the burden of healthcare spending on life expectancy, (maternal and child mortality) in the four World Bank income category countries namely low-income, lower-middle-income, upper-middle-income and high-income countries. Using a panel dataset of 217 countries, 1999-2020, the research adopts Fixed Effects Model (FEM) and Random Effects Model (REM) with Hausman test indicating the use of FEM as an estimation method. Results indicate that higher expenditure on healthcare, greater life expectancy, and lower death rates overlap to the growth of the economy in all categories of income. In addition, the impact of control variables is income level dependent, and thus, it highlights the subtlety of the relationship between health investment and economic performance. The question is that of the precarious role of healthcare spending in developing human capital, productivity, and long-term economic growth.*

Keywords: Health Economics, Enterprise Growth, FEM, REM

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Introduction

Adequate financial allocation demonstrates a necessity to improve the efficiency of the healthcare system of a country (Alhassan et al., 2021). The strategic government investment in healthcare does not just restore the poor health outcomes of the population but it also generates economic growth. Recent literature elicits the idea that spending on healthcare increases, longer life expectancy, reduced mortality rates and have a positive impact on the economic development. However, whereas augmented public health has been widely defined as a contributor of economic development, the correlation between the cost of healthcare and the main health outcomes, including mortality rates and life expectancy, is still multifaceted (Van den Heuvel & Olaroiu, 2017).

Countries with high healthcare investments are tilted towards increased life expectancy and reduced mortality rates (Galvani-Townsend et al., 2022). Nevertheless, the funding of healthcare in the low- and middle-income countries (LMICs) is still inadequate (WHO, 2020). The general aim is to hypothesize the empirical data on the effect of healthcare expenditure on the economic growth of various countries. This research falls under Sustainable Development Goal (SDG) 3: Good Health and Well-Being that identifies the importance of strategic healthcare funding in the progress of universal health access and the maximization of the population health outcome. This analysis has shown the need to have adequate financial resources to ensure sustainable growth and reduce health disparities globally by considering the economic impacts of health spending in different income groups. Besides, it evaluates the differences in the four country income groups of the world bank; (1) low-income, (2) lower-middle-income, (3) upper-middle-income and (4) high-income countries. Considering the possible biases presented by the COVID-19 crisis, the balanced and complete analysis employed the panel information covering the period between 1999 and 2020.

Literature Review

Healthcare Investment and Economic Growth: A Global Perspective

This has been followed by an earthquake of inquiry into the connection between economic performance and life expectancy in which a big positive association between health gains and economic growth has been noted, which is usually expressed in terms of GDP (Gross Domestic Product) per capita. World Health Organization (WHO) are essential sources of information about the trends in health around the world, especially following the COVID-19 pandemic. Prior to the pandemic, life expectancy at birth rose all over the world by 66.8 years to 73.3 years, and the healthy life expectancy rose by 58.3 years to 63.7 years. These patterns support the importance of sustained healthcare investments in improving the health of the population and their economic strength.

The Role of Healthcare Spending in Economic Growth

State funding of healthcare is crucial in humanizing population health. Sultana et al. (2024) revealed that high healthcare expenditure is important in decreasing maternal and child

mortality and increasing life expectancy with a larger hospital capacity. Economic development can be achieved through improved healthcare systems because it leads to a healthier work force and higher productivity.

Zheng and Lu (2020), enhanced the concept that healthcare expenditure is an investment form, that increased spending of health enhances productivity, higher wages and the overall economic welfare. Similarly, Phi (2017) also investigated healthcare expenditure across 35 countries of the OECD over the years 2000 and 2013 and revealed that the amount of GDP (Gross Domestic Product) per capita plays a major role in determining healthcare expenditure. However, it also showed reverse causality implying that the healthcare spending can, conversely, affect GDP per capita.

Gross Domestic Product (GDP) per Capita, Mortality Rates, and Economic Resilience

The GDP per capita and mortality rates are the variables that have been subjected to a lot of scrutiny in the economic literature. In a six-decade panel regression analysis, Doerr and Hofmann (2020) determined that the decreases in the GDP per capita in developing nations are associated with the rise in the mortality rates. Economic recession and expansions seem to have an inverse relationship with the mortality rates.

A 135-country dataset of 1990-2014 by Rocco et al. (2021) revealed that a 10% decrease in mortality and disability-adjusted life years (DALYs) may boost GDP per capita by 10 percentage points in 25 years. Temsumrit (2023) also pointed to the example of Sub-Saharan Africa, in 2019, 55 percent of the worldwide child deaths were observed in this country, which is equivalent to about 2.8 million deaths. The region has recorded slow but steady growth in healthcare investment despite the relatively low levels of spending on health as people have made efforts to ensure that the rate of child mortality is reduced.

Bridging the Research Gap: A Global Income Classification Approach

The economic growth rate of different countries is very different and certain countries have a higher rate growth because of their natural resources like investment in health care, expectancy and mortality. In order to fill this gap, this paper has divided countries into different groups according to the income classification system of the World Bank, which includes low-income countries, lower-middle-income countries, upper-middle-income countries, and high-income countries and has investigated the inter-relationship of healthcare expenditures, life expectancy, and economic development. Through this strategy, the study would achieve a holistic perspective of the impact of healthcare investment on economic performance in the world.

Motivating Theory, Data, and Methodology

Endogenous Growth Theory argues that internal processes, mainly investing in human capital, catalyses a country's economic growth; and that the state of one's health is a principal determinant of economic progress. Health is, therefore, considered a resource or capital that nations should prioritize. However, there have been arguments against this theory, claiming that it fails to account for long-term economic development. From this, Romer and Lucas extended the theory by integrating elements that explore economic growth (Wang, 2015).

The estimation methods used are the fixed effects model (FEM) and random effects model (REM) from World Bank panel dataset of 217 countries from 1999 to 2020. The panel data set is measured across (*a)* Worldwide data points and (*b)* By income classification. Various international organizations classify income levels differently. For consistency, the income classification of the World Bank was utilized, namely low income, lower middle income, upper-middle income, and high-income countries. The log-linear model used is:

$$(1)\ logGDPPPC_{c,t} = \beta_0 + \beta_1 logLife_{c,t} + \beta_2 logHEX_{c,t} + \beta_2 logMortal_{c,t} + \theta_c + \lambda_f + \boldsymbol{\mu}_{c,t}$$

where: $GDPPPC = GDP\ per\ capita, PPP\ (current\ international\ \$)$

$Life = Life\ expectancy\ at\ birth, total\ (years)$

$HEX = Current\ health\ expenditure\ per\ capita, PPP\ (current\ international\ \$)$

$Mortal = Mortality\ rate, infant\ (per\ 1{,}000\ live\ births)$

$\theta_c = Country\ fixed\ effects$

$\lambda_f = Year\ fixed\ effects$

$\boldsymbol{\mu}_{c,t} = Error\ term$

Under this model, the dependent variable is the log form of *GDPPPC*, where it is used as an indicator to measure the economic growth of a country. The control variables of the equation consist of 1) Life expectancy at birth *(Life)*, 2) Current Health Expenditure per capita *(HEX)*, 3) Mortality rate *(Mortal)*.

The study used the log-linear form of *Life* to assess the population's health. Theoretically, the increase in life expectancy results in a lower fertility rate and higher returns on human capital investments boosting economic growth and thus yielding a higher GDP per capita. On the other hand, the log-linear form of *HEX* was utilized to estimate a country's total public spending on health. Strengthening health spending will enhance the welfare of individual's and contribute to the improvement of human capital in a given country. Lastly, the log-linear form of *Mortal* was used to measure the survival rate of children in an economy. Lower mortality rates arise from increased economic activity and conditions.

Meanwhile, as independent variables may have unobserved heterogeneity, the fixed-effects model will control the impact of unobserved variables. The country-fixed effects assess the influence of changes in the HEX on economic growth over time within a country. The year fixed-effects, on the other hand, are used to control global economic trends. The following are the descriptive statistics for the variables chosen:

Table 1: Descriptive Statistics, Global

Variables	Obs.	Mean	Std. Dev.	Min	Max
Life Expectancy, total years	4307	4,238	0.142	3.654	4.448
Health Expenditure per capita, PPP (current International $)	3636	6,196	1.334	1.891	9.271
Mortality rate, infant (per 1,000 live births)	4158	2,886	1.065	0.405	4.955

Table 2: Descriptive Statistics of Control Variables, Low and Lower Middle-Income Countries

Variables	Low Income					Lower Middle Income				
	Obs.	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**
Life Expectancy, total years	567	4.044	0.118	3.654	4.309	1,155	4.166	0.128	3.749	4.343
Health Expenditure per capita, PPP (current international $)	447	4.358	0.627	1.891	5.875	1,013	5.22	0.695	3.081	7.472
Mortality rate, infant (per 1,000 live births)	567	4.112	0.46	2.573	4.955	1,155	3.583	0.577	1.808	4.821

Table 3: Descriptive Statistics of Control Variables, Upper Middle- and High-Income Countries

Variables	Upper Middle Income					High Income				
	Obs.	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	Max.
Life Expectancy, total years	1,073	4.264	0.118	3.916	4.385	1,386	4.357	0.044	4.159	4.448

Health Expenditure per capita, PPP (current international $)	979	6.385	0.627	4.581	8.064	1,083	7.697	0.592	6.028	9.271
Mortality rate, infant (per 1,000 live births)	1,113	2.81	0.46	0.693	4.700	1,197	1.671	0.638	0.405	3.538

Table 1, shows the mean values of the control variables, log gross domestic product per capita, health expenditure per capita, and mortality rate on a global level from 1999-2020. Table 2 and Table 3 shows the descriptive statistics for the four income classifications of the control variables across the years 1999-2021. From the statistics given above, the mean values of health expenditures per capita and life expectancy increases as income level classification increases, with low income having the lowest mean and high income having the highest. However, the mortality rates would decrease as income classification goes up to High Income.

Results and Analysis

Utilizing a panel data set, Fixed Effects Model (FEM) and Random Effects Model (REM) was employed to estimate the relationship of GDP per Capita and health related explanatory variables, namely Health Expenditure per Capita, Mortality Rate, and Life Expectancy. Table 4 and Table 5 pertains to the estimation results from the global dataset and the four country income classifications, respectively. To test the validity of the REM, the Hausman Test was used and the result is shown in Table 6.

When performing Hausman's (1987) specification test, the null hypothesis $H0$ indicates that the random effects model (RE) is consistent and can be applied; while the alternative hypothesis $H1$ indicates that the fixed effects model (FE) is consistent. Across the global data and the different income classifications, the p-value < 0.05, which indicates that we should accept $H1$. Thus, the fixed effects model for this research is more favored than the random effects model.

Table 4: Fixed Effects Model and Random Effects Model, Global

	(1)	(2)
VARIABLES	GLOBAL FE	GLOBAL RE
Life Expectancy	0.633***	0.637***
	(0.0804)	(0.0797)
Health Expenditure per capita	0.408***	0.433***
	(0.0109)	(0.0107)

Mortality rate	-0.484***	-0.448***
	(0.0186)	(0.0178)
Constant	5.236***	4.959***
	(0.369)	(0.366)
Observations	3,407	3,407
R-squared	0.799	
Number of Cid	188	188

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

H_0: *The control variables do not have a significant impact on GDP per capita of the global data points*
H_a: *The control variables do have a significant impact on GDP per capita of the global data points*

Table 5: Fixed Effects Model and Random Effects Model, by Income Classification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**LI FE**	**LI RE**	**LMI FE**	**LMI RE**	**UMI FE**	**UMI RE**	**HI FE**	**HI RE**
Life Expectancy	0.985***	0.973***	0.730***	0.680***	0.806***	0.665***	3.103***	2.786***
	(0.288)	(0.280)	(0.134)	(0.134)	(0.178)	(0.176)	(0.552)	(0.539)
Health Expenditure per capita	0.245***	0.263***	0.278***	0.306***	0.567***	0.593***	0.446***	0.473***
	(0.0239)	(0.0235)	(0.0183)	(0.0183)	(0.0199)	(0.0195)	(0.0289)	(0.0281)
Mortality rate	-0.372***	-0.352***	-0.726***	-0.673***	-0.371***	-0.331***	-0.106**	-0.0841**
	(0.0881)	(0.0859)	(0.0366)	(0.0366)	(0.0294)	(0.0288)	(0.0410)	(0.0396)
Constant	3.694**	3.586**	6.360***	6.236***	3.296***	3.589***	-6.375***	-5.238**
	(1.477)	(1.437)	(0.661)	(0.667)	(0.771)	(0.768)	(2.328)	(2.271)
Observations	423	423	999	999	905	905	973	973

R-squared	0.782		0.831		0.852		0.743	
Number of c_id	23	23	54	54	51	51	54	54

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: LI = Low Income countries; **LMI** = Low Middle-Income Countries; **UMI** = Upper Middle-Income Countries; **HI** = High Income Countries

Table 6: Hausman (1978) specification test, Global and by Income Classification

	Global Coef.	**LowInc Coef.**	**LowerMidInc Coef.**	**UpperMidInc Coef.**	**HighInc Coef.**
Chi-square test value	194.213	15.422	129.616	42.434	15.936
P-value	0	.001	0	0	.001

Economic Growth and Life expectancy

Table 4 presents the results of the variables on a global scale. The FEM estimation suggests that an increase of 1% in Life Expectancy would increase GDP per capita by 63%. This is consistent with the findings of both Rajesh Sharma (2018) and Hussain (2012) in which improvement of Life Expectancy led to positive effect on GDP per capita. Comparable with worldwide data, there is a positive connection between life expectancy and GDP per capita throughout the four income classes as seen in Table 5. The estimation results juxtapose sharply with Acemoglu and Johnson's (2007) conclusions, notably for LI (low-income countries) and LMI (Low Middle Income). According to the FEM, a 1% rise in Life Expectancy would raise GDP per capita by 98%, 73%, 80% and 310% for LI (Low Income countries); LMI (Low Middle-Income Countries); UMI (Upper Middle-Income Countries) and HI (High Income Countries), respectively. It is observed that when Life Expectancy increases, the coefficient decreases from LI countries up until UMI countries, thus this implies that LI countries benefit more from increasing life expectancy for economic growth in terms of GDP per capita. It is also worth noting that HI nations have the greatest coefficient; which can be attributed to a shift in population demographics, since living longer would imply being able to work more, and so becoming more productive.

The estimates entail that an increase in life expectancy would reduce transmission and contraction of diseases and improve health conditions. An improving Life Expectancy could lead to better workforce productivity; a longer life expectancy would also allow them to work longer years or years closer to the retirement age of their country. Furthermore, improving Life

Expectancy is considered as an investment added towards human capital and it translates into economic growth through GDP per capita, this denotes that Life Expectancy is a sign of an improvement in global standards of living. This investment should be prioritized by policymakers since it has a substantial potential to boost the economy.

Economic Growth and Health Expenditure

As for Health expenditure per Capita, a 1% increase will also increase GDP per Capita by 40%. This denotes that the results effectively show the coefficients on health expenditure per Capita is positive on a global scale. A positive relationship is also depicted by health expenditure per capita and GDP per capita throughout all the income classifications for both FEM and REM. The FEM estimation presents that a 1% increase in this variable will increase GDP per Capita by 25% for LI, 28% for LMI, 57% for UMI and 45% for HI. The impact of health expenditure per capita for upper middle income and high-income countries is higher than the low and lower middle-income countries. As Schieber and Maeda (1999) and Baltussen (2006) stated, the investment in healthcare facilities and systems of countries varies with developing countries primarily needing the access to such services and resources are frequently spent on low-impact programs. Low and lower middle-income countries are still struggling with economic affairs. The benefits of HEX, have some limits for countries with high incomes. Wang (2015) noted that growing health expenses might crowd out other expenditures in high income countries.

Investments from Health Expenditure per capita by countries will in turn ameliorate economic growth, through GDP per capita as the proxy variable. Consistent with Bloom and Canning (2003), Bleakly (2010), Wang (2015), Bedir (2016), Phi (2017), Piabuo and Tieguhong (2017), Zheng and Lu (2020), Raghupathi (2020). They indicated an association between Health Expenditure and GDP per Capita. It conveyed that stronger public health systems are necessary for providing treatment for the sick and establishing measures to promote wellness and avoid disease. Thereby increasing human capital given that a healthier population can lead to a more efficient workforce and hence, higher labour productivity.

Economic Growth and Mortality Rate

However, a 1% increase in the mortality rate would decrease GDP per Capita by 48%, under FEM. Across the four income classifications, the 1% in Mortality rate would decrease GDP per capita by 37% for LI, 73% for LMI, 37% for UMI and 11% for HI. This coincides with the findings of Dayanikli, et al. (n.d.) and Doerr, et al. (2020) advocating that there is an inverse relationship between mortality rates and GDP Per Capita. Ozcan (2000) stated that lower mortality rates would give a strong incentive to boost investment, which will improve human capital in the long run. It is worth noting that the estimates show a big disparity between the coefficients of Mortality rates. A 1% increase in Mortality Rate only decreases HI GDP per capita by 11% while Lower Middle-Income countries lose a huge 71%. A possible explanation for this is demographic transition in developing countries such as LMI countries. In Warren Thompson's Stages of demographic transition, the second stage requires reducing mortality

rates since it impacts a country's development at the stage of transition, where more labourers are needed to be more productive. Conversely, countries in HI countries with relatively older populations are experiencing abundant levels of human capital thus covering for the lack of productivity of older labourers. This is also akin to Rocco, et al. (2021) where the effect of mortality rates is stronger for lower income countries compared to HI countries.

Conclusion

The drivers for economic growth have been the nub of diverse exploration over the past years. Diebolt and Hippe (2018) realized that human capital is the primary engine for economic growth whereas health and education are the main factors that influence it. With this, the all-encompassing goal is to examine the link between economic growth and public health spending.

Using fixed effects model (FEM) and random effects model (REM), the outcomes disclose that (higher life expectancy, increase in health expenditure and reduced mortality rates) have a beneficial influence on fostering economic growth throughout the global data points and the four income classifications. The Hausman test results indicated that FEM is more fitting than REM. It is also rudimentary to note how the influence of the control variables varies across the four income classes.

A positive relationship between economic growth and health expenditures is evident. Increasing health expenditures will upturn the well-being of the population and build nurture human capital. Higher life expectancy also processes a higher rate of return on human capital investment. Given that human capital investment has been identified as a key driver of economic growth, then health-related indicators such as health expenditure, life expectancy, low mortality rates subsist as a noteworthy factor to cogitate in the development of an economy. Development in human capital, it will lead to higher productivity. While productivity rises, the value of labour intensifies as well, ensuing wage upsurges. Consequently, able to produce and consume added goods and services for the same amount of work, henceforth stimulating economic growth.

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