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Healthcare Expenditure and Economic Growth in Sub-Saharan Africa

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

This paper investigated the effect of health expenditure on economic growth in Sub Saharan Africa. The linear dynamic generalized method of moments instrumental variable (GMM-IV) was used on a panel data of 38 Sub-Saharan African countries over the period 2000-2016. Findings reveal that health expenditure significantly improves economic growth in Sub Saharan Africa. The separate effects of Public and private health expenditures have also shown a significant positive relationship on economic growth. In addition to health expenditure, other determinants like gross domestic saving, foreign direct investment, and labor force brought a statistically significant improvement on economic growth, whereas official development assistance has a statistically insignificant effect on economic growth. This study concluded that health expenditure is an important element in attaining improved economic growth in Sub-Saharan African Countries as it assured a healthy workforce and the country's populace. Therefore, increasing the amount of health expenditure allocated to the health sector yields a better economy. More on, revising policies to improve gross domestic savings and foreign direct investment also assure a better economic growth.

Keywords: Health expenditure; economic growth; GMM-IV; Sub-Saharan Africa.

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1. INTRODUCTION

Investment in human capital is one of the major aspects in assuring economic growth and sustainable development [1]. As a good indicator to Human capital, health has been considered as an important contributing factor to economic growth. Healthy people are highly productive and earn more reward. In contrast, sickness and debility negatively affect earnings, mainly in developing countries where most of the work requires manual labor. Various health economic studies underline healthcare expenditure as an essential element in clarifying disparities across countries. Making more efforts on health improvement is widely considered as the main concern and can be realized when enough health care expenditure is allocated [2]. For instance, in Sub-Saharan Africa where resources are relatively limited, health expenditure per capita for the year 2000 was $ 32.39 and later reached $ 69.19 in 2015 and this has been reported insufficient as the health care load in the region outweighs the expenditure allocations [3]. Health expenditure comprises expenses on the delivery of health services (preventive and curative), family planning activities, nutrition activities, and emergency health aid (World Bank, 2018). Lack of considerable attention on the role of health expenditure is one of the reasons for inadequate health resource allocation in Sub-Saharan Africa. Moreover, mismanagement of resource allocated to the health sector and poor health care system are also among other things [4].

In the history of health economics, only few Studies show the association between healthcare expenditure and economic growth. Currently, this issue is concerning for a number of scholars and literature in this aspect that have most commonly considered health expenditure as an independent variable and economic growth as a dependent one. Available studies on the relationship between health expenditure and economic growth revealed mixed results. Some of the studies proved no relationship between health care expenditures and economic growth. For instance, for the year 1970 – 2013, the relationship between government health expenditure and economic growth was studied by Anne et al. [5] in Nigeria. Yamamoto Causality Approach was used and results showed that government health expenditures did not directly influence economic growth. On the other hand, other empirical works have revealed the existence of relationship between healthcare spending and economic growth using various methodological approaches.

For the years 1981-2013, the relationship between healthcare expenditure and economic growth was studied by Alhowaish [6] in Saudi Arabia. Granger Causality approach was employed and Granger causality test indicated that there was unidirectional causal association running from economic growth to healthcare expenditure.

Using Feder–Ram model, Kurt [7] explored the direct and indirect (external) effects of health expenditure on economic growth in Turkey. The results revealed that the direct impact of government health expenditures on economic growth was positive and significant.

Based on the data collected from central African states and selected African countries, Serge and Julius [8] examined a comparative analysis on the impact of health expenditure between countries that achieved the Abuja declaration. Panel data, fully modified, and dynamic ordinary least square were used and results depicted that health expenditure had a positive and significant effect on economic growth.

In Nigeria, Oni [9] examined the impact of health expenditure on economic growth for the year 1970-2010. He used multiple regression analysis and the result shows that total health expenditure is a vital determinant on economic growth in Nigeria.

Since majority of literature have inadequacy in examining the distinct effects of public and private health expenditure on health outcome and as only very few of the studies highlighted endogenous issues that resulted from an incidence reverse causality, this study considered the problem of endogeneity by means of linear dynamic generalized method of moment's instrumental variable (LDPD GMM-IV) as a method of estimation. It provides new pieces of evidence on the distinct effects of public and private health expenditure and also draws direction on health policy amendments targeted at improving the amount of health expenditure, thereby resulting to a noticeable economic growth.

2. METHODOLOGY

2.1 Data

This study used annual panel data from 38 Sub-Saharan African countries spanning the period 2000 to 2016. The data was obtained from the

World Bank and World Development Indicators. The countries were selected based on the availability of data.

2.2 Theoretical Framework and Model

Many scholars have shown interest and gave special attention to the different factors that influence economic growth. Solow (1956) introduced economic development model known as Solow growth model, it undertakes a neoclassical production function with diminishing returns to capital, that is, total income (*Y*) depends on physical capital *K* and effective labor *AL*, where effective labor is denoted as the product technology *A* and labor *L*. Moreover, Solow proposed saving rate as exogenous contributing factor to clarify disparity in economic growth rate across countries. Solow believes that a higher saving rate is expected to bring capital accumulation thereby leading to economic growth. Considering human capital as a significant element to economic growth, Mankiw et al. [10] upgraded the Solow model which is called the augmented Solow growth model. He indicated that Human capital, Physical capital and Labor together could better explain economic growth differences among countries than Physical capital and Labor alone.

Health is widely considered as human capital and has a significant contribution to economic growth in several ways. Healthcare spending is expected to enhance the health of the work force and thereby improve productivity. An increase in labor productivity certainly increases economic growth.

The theoretical framework adopted in this study is on the basis of Aboubacar and Xu [4] who followed Narayan et al. [11]. To build the model, the following aggregate production function has been taken in to consideration.

$$Y = AK^{\alpha}L^{\beta} \quad (1)$$

Where Y is Gross Domestic Product (GDP), A is a total factor productivity, K is a capital stock and consists of Gross Domestic Saving (GDS), Foreign Direct Investment (FDI) and Net Official Development Assistance (NOA). L is labor comprising Health expenditure (HE) and labor force (LF).

By applying logs, equation (1) can be expressed as follows;

$$\ln GDP = \theta + \alpha_1 lnGDS + \alpha_2 lnFDI + \alpha_3 lnNOA + \beta_1 lnTHE + \beta_2 lnLF + \mu t \quad (2)$$

Equation (2) can further be re-written for country i at a time t to express the simple panel model.

$$lnGDP_{it} = \theta_i + \alpha_{1i} ln\, GDS_{it} + \alpha_{2i} ln\, FDI_{it} + \alpha_{3i} ln\, NOA_{it} + \beta_{1i} ln\, THE_{it} + \beta_{2i} ln\, LF_{it.} \quad (3)$$

To simplify the equation using a common denominator, α_i is replaced in the coefficients and written as follows.

$$lnGDP_{it} = \theta_i + \alpha_1 ln\, GDS_{it} + \alpha_2 ln\, FDI_{it} + \alpha_3 ln\, NOA_{it} + \alpha_4 ln\, THE_{it} + \alpha_5 ln\, LF_{it} \quad (4)$$

As total health expenditure is a sum of the public and the private health expenditure, to examine the distinct effect of public and private health expenditure on economic growth the following models is specified in equation (5).

$$lnGDP_{it} = \theta_i + \alpha_1 ln\, GDS_{it} + \alpha_2 ln\, FDI_{it} + \alpha_3 ln\, NOA_{it} + \alpha_4 ln\, GHE_{it} + \alpha_5 ln\, PHE_{it} + \alpha_6 ln\, LF_{it} \quad (5)$$

Where GHE and PHE are Public and Private Health expenditures respectively.

Control variables were used and these included Gross Domestic Saving, Foreign Direct Investment, Net Official Development Assistance and Labor Force. The estimations are done with the help of the statistical software STATA (version13).

3. EMPIRICAL RESULTS AND DISCUSSION

3.1 Descriptive Statistics

Table1 illustrates summary statistics of the variables. The mean, standard deviation, minimum and the maximum values of the variables are reported. The statistics show that the average Gross Domestic Product, GDP (PPP) over the years is $6.03e+10, with a minimum of $2.32e+08 and a maximum of $ 1.10e+12. Total health expenditure per capita (THE) has a mean value of $95.7863; its minimum and maximum values are $4.6906, $597.3594 respectively. Public and private health expenditure per capita (GHE and PHE) have a mean value of $95.14799, $ 90.9781; with a minimum value of $ 0. 2615871, $ 2.75227; and a maximum of $1077.357, $671.6896 correspondingly. Average gross domestic (GDS) saving is $ 6.71e+09, with minimum and maximum values of $-2.39e+09 and $1.47e+11respectively. The mean, minimum and

Table 1. Summary statistics

Variables	Mean	Sta. div.	Min.	Max.	Obs.
GDP	6.03e+10	1.46e+11	2.32e+08	1.10e+12	608
THE	95.7863	126.467	4.690651	597.3594	608
GHE	95.14799	154.389	.2615871	1077.357	608
PHE	90.9781	108.8906	2.75227	671.6896	608
GDS	6.71e+09	1.73e+10	-2.39e+09	1.47e+11	608
FDI	5.103986	9.334771	-5.208123	103.3374	608
NOA	7.34e+08	9.35e+08	-1.68e+07	1.13e+10	608
LF	7852145	1.03e+07	44726	5.74e+07	608

Table 2. Regression results of the effects of health expenditure on economic growth

Independent variables	Regression results based on equation 4			Regression results based on equation 5		
	FE	RE	DPDE	FE	RE	DPDE
	lnGDP	*lnGDP*	*lnGDP*	*lnGDP*	*lnGDP*	*lnGDP*
ln (Health Expenditure)	0.232***	0.370***	0.655***			
	(0.0188)	(0.0182)	(0.0232)			
ln health expenditure (Public)				0.0551***	0.121***	0.258***
				(0.0150)	(0.0176)	(0.0173)
ln health expenditure (Private)				0.176***	0.277***	0.303***
				(0.0220)	(0.0256)	(0.0215)
Gross domestic saving	0.0295***	0.0408***	0.146***	0.0749***	0.118***	0.185***
	(0.00863)	(0.0102)	(0.0125)	(0.00831)	(0.00960)	(0.00963)
Foreign direct investment	0.0242***	0.0327***	0.0486***	0.0211***	0.0304***	0.0783***
	(0.00510)	(0.00608)	(0.0109)	(0.00533)	(0.00654)	(0.00912)
Labor force	1.551***	1.000***	0.915***	1.699***	1.079***	0.740***
	(0.0562)	(0.0400)	(0.0261)	(0.0543)	(0.0436)	(0.0178)
Net official assistance	0.0238	0.00216	-0.225	0.0320	0.0133	-0.0767
	(0.00878)	(0.0104)	(0.0206)	(0.00910)	(0.0111)	(0.0158)
Constant	-1.661**	6.399***	8.872***	-5.058***	3.289***	8.147***
	(0.825)	(0.571)	(0.280)	(0.735)	(0.590)	(0.217)
Number of observation	608	608	608	608	608	608
F-Test, (p-value)	837.73	-	-	633.51	-	-
	(0.000)			(0.000)		

Independent variables	Regression results based on equation 4			Regression results based on equation 5		
	FE	RE	DPDE	FE	RE	DPDE
	lnGDP	*lnGDP*	*lnGDP*	*lnGDP*	*lnGDP*	*lnGDP*
R-Squared	0.915	0.8927	-	0.907	0.8761	-
Wald test χ^2, (p-value)	-	3067.54 (0.0000)	45,805.50 (0.0000)	-	2583.67 (0.000)	54,420.21 (0.0000)
Hausman test χ^2, (p-value)	181.87 (0.000)		-	344.56 (0.000)		-
Sargan test χ^2, (p-value)	-	-	38.67 (0.65)	-	-	37.43 (0.38)
Arellano-Bond Autocorrelation test (AR) z-value (p=value)	-	-	AR(2) 3.963 (0.43)	-	-	AR(2) 1.654 (0.13)
Number of instrumental variables	-	-	113	-	-	153

Standard errors in parentheses

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

Notes: 1) FE- Fixed Effects Model; RE- Random Effects Model; DPDE- Dynamic Panel Data Model.

2) t-values are for the FE Estimation, and z-values are for the RE and LDPD estimations are shown in the parentheses. 3) P denotes the probability value 4) Regression results based on equation 4 considers total health expenditure; 5) Regression results based on equation 5 comprises public and private health expenditure distinctly

maximum values of foreign direct investment (FDI) as a percentage of GDP are 5.103986, −-5.208123 and 103.3374respectively. Net official development assistance (NOA) has mean, minimum and maximum values of $ 7.34e+08, $ -1.68e+07and $ 1.13e+10 respectively. Lastly, labor force (LF) (People age 15 & above) has a mean value of 7852145, a minimum value of 44726 and a maximum value of 5.74e+07.

In the first column of Table 2, fixed effect, random effect, and dynamic panel data estimates reveal the effects of total health expenditure on economic growth (Regression results based on equation 4). The last column displays the distinct effects of public and private health expenditure on economic growth (Regression results based on equation 5). The results are primarily built on the basis of dynamic linear panel data GMM model estimates. The models passed through a number of diagnostic tests namely Wald, Arellano-Bond autocorrelation and Sargan. The significance of each explanatory variable is verified by the Wald test. This test rejects the null hypothesis which indicates that the model is significant when all the parameters related to these variables are not zero. Arellano-Bond autocorrelation is a test to identify serial correlation in the disturbances. The incidence of serial correlation affects the validity of the instrument. This test results do not reject the null hypothesis of no serial correlation which ascertains its validity. Sargan test indicates the validity of an instrument on the essence that residual should be uncorrelated with instruments. This test does not reject the null hypothesis ensuring over-identification restrictions are effective or valid. In addition, the Hausman test failed to reject the RE estimation in approval of the FE. The modified Wald test for the group wise was performed to test heteroscedasticity and this test indicated that residuals were homoscedastic meaning that there was an incidence of constant variance. Health expenditure was found to be one of the factors influencing economic growth in Sub-Saharan Africa. As presented in Table 2, health expenditure brought a considerable effect on economic growth. The finding showed that an increase in total per capita health expenditure by 1% would increase economic growth by about 0.655%. Both public and private health expenditures had a significant effect on economic growth. Although the separate effects of public and private health expenditure confirmed a significant enhancement on the economic growth, private expenditure showed a higher effect on economic growth. The coefficients of the control variables GDS, FDI, and LF were positive and statically significant but NOA was statistically insignificant. The extent of the coefficients of GDS, FDI, and LF are 0.146, 0.048 and 0.915 respectively; indicating that an increase by 1% in GDS, FDI, and LF, lead to increase GDP per capita by 0.146%, 0.048% and 0.915% respectively. Foreign direct investment creates technology transfer, encourages domestic investment, reduces unemployment and facilitates improvements in human capital &institutions, and has been improving in Sub-Saharan African countries since 2000 which in turn brought significant positive effects on economic growth. Savings is an important input for securing investment and has shown improvement over the years in Sub-Saharan Africa. The increase in savings leads to an increase in investment hence promoting economic growth.

4. CONCLUSION

This paper examined the association between health expenditure and economic growth in Sub-Saharan Africa. The results showed a positive and significant relationship between total, public, and private health expenditures and economic growth. Hence, an increase in health expenditure plays a significant role in improving economic growth in Sub-Saharan Africa as increased expenditure implies easy and timely access to medical services by the workforce and general populace. Although both public and private health expenditures are important elements in improving economic growth in Sub-Saharan Africa, private health expenditure had comparatively a greater effect on economic role hence the emphasis on the role of the private sector in economic growth in Sub-Saharan Africa. Other determinants like gross domestic saving, foreign direct investment, and labor force also brought a positive contribution on economic growth. In contrast, official development assistance was found not to bring improvement on economic growth in the region. In addition, revising policies to improve gross domestic savings and foreign direct investment could assure an increase in economic growth in the region. More so, to maintain a steady economic growth, policymakers should undertake actions aimed at creating more job opportunities.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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