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Health Spending and Economic Growth: Role of Spending

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Abstract:

This study investigates the impact of public health expenditure on economic growth in Nigeria. OLS methodology was employed to analysis the time series data sourced from CBN statistical bulletin in the course of the study ranges from 1981-2015. The result unit roots test shows the stationarity of the data at first difference. The regression analysis result established that there is bidirectional causality between government spending on health and economic growth in Nigeria. Health spending has positive and significant effect on economic growth in Nigeria with coefficient of determination of 98%. Recommendation was made that recognition of the fact that increase in government spending enhances the growth of the economy. This necessitate that there should be an increase funding of the health sectors; more so concerted efforts should still be committed to funding crucial projects that will culminate to evident outcomes in the health sectors. Also, government would need to establish new partnerships with the stakeholders in private businesses in the sector where its relevance is gradually declining) in order to mobilize the necessary resources to stimulate efficiency. The international organizations should also be contacted for development assistance in conformity with their commitment to African countries.

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Introduction

The relationship between health status and economic growth has received generous enquiries in the literature. Outcomes from several studies seem to suggest that there is a positive association between health status and economic development. The wide acceptance of this nexus prompted the prominence of health outcome in the Millennium Development Goals (MDGs) (Bird, 1971). In fact, three of the goals are health specific while the others can also be regarded as health enhancing. However, the channels that drive this relationship are fraught with disagreements. While high health expenditure is viewed as a channel of developing the health status of a nation, the results differ across countries and regions! Thus, the financing of health care expenditure (HCE) becomes more important in many resource constraint countries (Chete & Adeoye 2002.

The opportunity costs of spending on health is very high and thus the need for a justification on the increase or otherwise of health spending in such countries. Incidentally, Sub-Saharan Africa (SSA) is arguably the most underdeveloped region in the world with its attendant problems. Therefore, provision of adequate funding for health care either by the household or the government remains difficult. Some authors have argued that this might be the reasons for the bad health outcomes in the region (Bloom, et al.,2004).

Communicable diseases and child mortality from preventable and treatable diseases are more prevalent in SSA than any other regions (World Health Report 2010). It is thus necessary to improve the funding of the health sector in order to improve the health sector of the region. The question of what determines the quantity of resources a country devotes to medical care continues to get attention from researchers and policy makers (Dauda, 2004). This attention is based on the assumption that a rise in the share of income spent on health care expenditures is a direct, or at least a natural, consequence of the secular increase in living standards because health care is a luxury good. The health status of Nigerian is still considerably low and exists below that of most parts of the world (Acemoglu & Simon 2007).

Despite the existence of a limited number of studies assessing health care expenditure and gross domestic product in Sub-Sahara Africa there exist a diversified opinion in regard to the income elasticity of health care expenditure. Using African data, Chete and Adeoye (2002) estimate the impact of per capita income on per capita health expenditure with 1984 data from 30 African countries and conclude that income elasticity of health expenditure is very close to unity while De la Croix and Delavallade, (2006) reports that health care income elasticity is greater than unit. Also it was reported that large variances in both per-capita GDP and per capita health expenditure shares of national incomes among countries and within regions in Africa. The disparities, along with systematic differences in demographic and socio-political structures have also generated large variances in health status or outcomes among countries (Federal Government Parastatals Agency Commission in Nigeria).

Understanding the extent of the linkage between the share of health expenditure in GDP and change in standard of living is important for several reasons. First, it enables a proper accounting of the notable growth in the health care sector over the last half century. Second, it is necessary for forecasting how health care spending is likely to evolve in the coming years (Dauda, 2004). Finally, it is a crucial step towards an assessment of the optimality of the growth of the health care sector. In particular, if health spending is strongly increasing in income, so that rising income can explain most or the entire rising health share, it would be more likely that the increasing share of GDP allocated to health is socially optimal. Many of

the studies find that there is a strong and positive correlation between the gross domestic product (GDP) of a country and the national expenditure on health care (Henrekson, 1993).
Nigeria's fiscal scenario poses significant risks to sustainable development, given that oil boom has increased government's expenditure from historical experiences of the 1970s. However, the size of government's non-productive spending and corruption has always swollen deficit budget. This calls for serious concern by policy makers to check the growth of government wage bills. Political corruption is responsible for budgetary inflation in Nigeria. (Dauda, 2006) Hence, there is a need for redirection and reposition of this present status of health expenditure in right sizing its roles on sustainable growth in the country.

Theoretical Framework

The theoretical framework for this study is based on extended human capital augmented Solow theory as explicitly discussed earlier. This choice is based on the fact that it has been established empirically that the results from other models are not significantly different (Hussain, 2002). Secondly, recent studies on human capital development/growth nexus on less developed countries preferred the augmented Solow model. A major strength of this framework is that it is amenable to both cross sectional and time series data environment. It also provides a mechanism to decompose human capital into different components without violating any of its assumptions. Following such established framework helps in testing the robustness of the model with different sets of data and it also allows for easy comparison.
In consonance with these conventions this study also aligns with the growing body of literature that has adopted this approach. However, unlike the previous studies which applied the model to cross sectional and panel data, this study modified the framework to suit a single-country specific analysis which is intended in this study.
More importantly, the human capital augmented Solow theory adopted in this study has been found to accommodate most of the assumptions and predictions of other growth theories (Greiner, 2005). For instance, it predicts that other things being equal, a country should have a higher level of per capita income if it has a high rate of investment in human capital. This assumption embedded the Dutt and Ghosh (1997) theoretical argument that a country's rate of growth depends on the fraction of time spent acquiring skills which in turn is a function of a number of preference parameters.
In similar manner, Dauda (2004) argued that human capital is an input in the production of new ideas, and therefore an important determinant of pace of innovation. Consequently, economic growth tends to accelerate as more human capital is employed in research (Marthins, 2005). Therefore, human capital augmented Solow model is equivalent to the predictions made by both Lucas and Dauda's growth theories that growth should be positively correlated with human capital development (Martins, 2005).
From the above discussion, the three models build on each other, showing that they are similar hence the adoption of human capital augmented Solow model invariably is like an adoption of all the salient assumptions and predictions of the three growth theories. It is clear that despite the differences in the modeling approach adopted by the three theories, the testable predictions of the models on the role of human capital in growth bear a remarkable semblance to each other. As Jorm (2000) noted, the consequence of this observational equivalence is that regardless of the findings which empirical investigations may yield, they do not allow a distinction between Solow model and the other growth theories. At best they give some clues regarding the question of which alternative endogenous growth approach is more appropriate.

Data Presentation and Analysis

Unit Root Tests

Prior to the estimation of OLS, the characteristics of the data have to be examined. Testing the stationarity of economic time series data is important since standard econometric methodologies assume stationarity in the time series while they are in the real sense non-stationary. Hence, the usual statistical tests are likely to be inappropriate and the inferences drawn are likely to be erroneous and misleading. For example, the ordinary least squares (OLS) estimation of regressions in the presence of non-stationary variables gives rise to spurious regressions if the variables are not co-integrated (Jayasuriya, & Wodon, 1974).

The trends of all the variables were used to conduct unit root tests to determine the stationarity of the variables using both the Augmented Dickey-Fuller (ADF) test and Philip Perron tests respectively. The results of the unit root tests are presented in tables 1 and 2. The results in Table 1and 2 show that all the variables are stationary in their first differences.

Table 1: Results of Unit Roots Tests using Augmented Dickey Fuller (ADF) for the time series data used in the empirical analysis.

Variables	ADF Statistical with Intercept	Probability	Order of Integration
RGDP	-3.2939*	0.0239	I(1)
HEXP	-4.7294*	0.0006	I(1)
GFCF	-4.1177*	0.0032	I(1)
TLBF	-3.5755*	0.0187	I(1)

*significant at 5 percent level (Source: Author's Computation)

Table 2: Results of Philip perron for the time series data used in the empirical analysis

Variables	Phillips-Perron test statistics	Probability	Order of Integration
RGDP	-3.2939*	0.0249	I(1)
HEXP	-4.7474*	0.0006	I(1)
GFCF	-4.1177*	0.0032	I(1)
TLBF	-3.5755*	0.0137	I(1)

*Stationary at 5 percent significant level of first difference **(***Source: Author's Computation***)**

The empirical evidence, from many literatures, has shown that most of the time series data are not stationary, this research work makes use of Augmented Dickey fuller and Philip Perron Test due to the problem of autocorrelation associated with the original Dickey Fuller using the model $\Delta Y_t = k\ ^{\beta}{}_1 + ZY_t + ai + et$ (Intercept Only). The null Hypothesis stated that the times series variables are not stationary or have unit root. The test in the above table reveals that the entire variables are stationary in their first difference.

This section presents the time series data gathered from secondary sources such as CBN, WDI in the course of the study and the analysis followed by the interpretation thereof. The least Square multiple regression result is presented as follows:

Dependent Variable: LOG(GDP)				
Method: Least Squares				
Sample: 1981 2015				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	

C	-10803339	1986540	-5.43827	0.0000
HEXP	53.07078	11.33143	4.683502	0.0001
TLBF	0.381701	0.060065	6.354765	0.0000
INFRATE	-8425.499	13876.68	-0.607169	0.5488
GFCF	4.828558	0.555058	8.699195	0.0000
R-squared	0.989078	Mean dependent var		8853167
Adjusted R-squared	0.98746	S.D. dependent var		11841431
S.E. of regression	1326041	Akaike info criterion		31.17589
Sum squared resid	4.75E+13	Schwarz criterion		31.40492
Log likelihood	-493.8143	Hannan-Quinn criter.		31.25181
F-statistic	611.2609	Durbin-Watson stat		2.101161
Prob(F-statistic)	0.0000			

The numbers in parenthesis under the parameter estimate of the corresponding standard errors. This establishes that the degree of error terms is considerably minimized and hence the estimates are reliable. The parameter estimates comply with a priori expectations which explain that the economic growth is grossly dependent on three main factors which are Physical capital accumulation proxy by gross fixed capital formation, Total Labour Force, inflation rate and particularly Health Expenditure.

Considering the magnitude 1units increase in GDP (proxy for economic growth) is brought about by 53units increase in Health expenditure (HEXP), 0.38units increase in Total Labour Force, -8425.49units increase in inflation rate and 4.82units increase in gross fixed capital formation. This postulates that an increase in health expenditure and other related variables will lead to increase in GDP (economic growth). The estimated value of R^2 (goodness of fit) of 0.99 or 99% shows that 99% systematic variation in Real GDP proxy for Economic Growth is caused by variation in allocation to health expenditure, total labour force, inflation rate and gross fixed capital formation. This equally ascertains that apart from the parameters or outside the scope of this analysis accounts for about 1% variation in the Economic Growth of Nigeria which is covered by the error terms (μ).

The adjusted R^2 when the degree of freedom is considered with the number of explanatory variable also explain the 99% variation in economic growth proxy by real GDP. However, the analysis is statistically significant. The overall significance of the entire model or the goodness of fit of the model as measured by the F-statistic shows that the F-statistic calculate (F^*) is greater than the F-statistic tabulated (F) at 5% level of significance, hence we accept the alternative hypothesis that variation in expenditure on health, Total labour force, inflation rate and gross fixed capital formation affect economic growth in Nigeria and ultimately affect

sustainable development in Nigeria. However, the analysis applies with econometrical criteria and shows that the model has overall significance and the coefficients are stable.

From the result, the intercept in the model though negatively related to RGDP [Economic growth] is significant. This is because the probability is less than 0.05 [P<0.05] indicating that the intercept is a significant factor. From the probability result the p-value stood as 0.0002 which shows that the intercept is a significant factor that determines the RGDP [Economic growth] If, or when all other Explanatory or independent variables are held constant, the economic growth proxy RGDP will be declining at the rate of -117137.1 this implies that if the government does not invest in Oil Exploration as well as gross fixed capital formation and total labour force which are determinants of Economic growth, the Gross domestic product of Nigeria will fall at the rate of 117137% which is an Astronomical fall in RGDP [Economic growth]

Expenditure on Health [HEXP] which is one of the important variables in the model shows a positive and significant relationship to RGDP p<0.01). This result shows that probability is less than 0.05. Hence, it shows that Total Expenditure on Health (HEXP) is a significant factor that determines GDP in Nigeria and also increases Economic growth. The result however is not surprising because from the A-prior expectation, It was clear that increment in [HEXP] will help improve RGDP in the country as well as the country's Economic growth.

Gross Fixed Capital Formation (GFCF) which is also an important variable in the model, this variable shows a positive relationship with RGDP and is also very significant. From the result it shows that a 1 percent increase in gross fixed capital formation (GFCF) will lead to 4.8% rise in RGDP which is referred to as an astronomical increase or rise in RGDP [Economic growth]. This explains that when the government starts investing in fixed capitals such as plants and machinery, Factory, land and its buildings, patients, copyrights, goodwill, computing and communication infrastructure that mostly include work station, servers, data storage, facilities, local area network, the internet, telephone fax e.t.c. It would result in the existence of these thing for long term needs. Gross fixed capital formation has shown a good and positive relationship with Economic growth in Nigeria which if invented in would help improve the real gross domestic products of Nigeria.

Labour force [TLBF] was positively related to RGDP (Economic growth) and is a significant factor that determines economic growth in Nigeria since P<0.05 it was significant at 5% level of significance. This implies that a 1percent rise or increase in labour force will surely lead to about 0.4% increase in RGDP (Economic growth) in the Nigerian Economy which shows an astronomical rise. When the Nigerian government invest in the labour force, for example formal labour which is s sort of employment that is structured and paid in a formal way, contributes greatly to the Nigerian Gross National Product which yields higher income and great benefits and securities for both men and women. From the result above it is shown that investment in the Nigerian labour force would improve the real gross domestic product (Economic growth) of the economy and would lead Nigeria into being a Developed Nation.

The F-statistic shows a value of approximately 611.3 which indicates that the overall model is significant with the probability value being P=0.00 which indicates a significance at 1 percent. The Durbin-Watson statistics shows a value of approximately 2.10 which shows the presence of serial correlation. The Akaike information criterion and Schwarz criterion shows about 31.2 and 31.4 respectively which indicates that the model selection is good. The Hannah-Quinn criterion also shows about 31.3 consequently the conformity with the expected sign

indicates that there is a direct relationship between each of the variables and Economic growth.

For the Reliability of the result, white heteroskedacity-consistent standard errors & covariance with the HAC standard errors and covariance test were used simultaneously which gives the result pasted below:

Table 3: White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-10803339	1986540	-5.43827	0.0000
HEXP	53.07078	11.33143	4.683502	0.0001
TLBF	0.381701	0.060065	6.354765	0.0000
INFRATE	-8425.499	13876.68	-0.607169	0.5488
GFCF	4.828558	0.555058	8.699195	0.0000
R-squared	0.971123	Mean dependent var		8853167
Adjusted R-squared	0.951271	S.D. dependent var		11841431
S.E. of regression	1326041	Akaike info criterion		31.17589
Sum squared resid	4.75E+13	Schwarz criterion		31.40492
Log likelihood	-493.8143	Hannan-Quinn criter.		31.25181
F-statistic	611.2609	Durbin-Watson stat		2.101161
Prob(F-statistic)	0.0000			

Table 4: HAC standard errors & covariance (Bartlett kernel, Newey-West fixed)

bandwidth = 4.0000)	Coefficient	Std. Error	t-Statistic	Prob.
C	-10803339	1986540	-5.43827	0.0000
HEXP	53.07078	11.33143	4.683502	0.0001
TLBF	0.381701	0.060065	6.354765	0.0000
INFRATE	-8425.499	13876.68	-0.607169	0.5488
GFCF	4.828558	0.555058	8.699195	0.0000
R-squared	0.971123	Mean dependent var		8853167
Adjusted R-squared	0.951271	S.D. dependent var		11841431

S.E. of regression	1326041	Akaike info criterion	31.17589
Sum squared resid	4.75E+13	Schwarz criterion	31.40492
Log likelihood	-493.8143	Hannan-Quinn criter.	31.25181
F-statistic	611.2609	Durbin-Watson stat	2.101161
Prob(F-statistic)	0.0000	Wald F-statistic	62.84309
Prob(Wald F-statistic)	0.0000		

From both results above, R^2 remains relatively the same without significant differences and also with other statistical method of evaluation. However, the model is reliable. This simply implies that the result is reliable for policy recommendation.

The wald test of significant impact of explanatory variable is presented below to show the single impact of Health expenditure (HEXP) on economic growth, the null hypothesis of the test indicates that HEXP is equal to zero c(2)=0, while alternative hypothesis is against it.

Table 5: Wald Test

Test Statistic	Value	Df	Probability
t-statistic	-4.281634	30	0.0002
F-statistic	18.33239	(1, 30)	0.0002
Chi-square	18.33239	1	0.0000
Null Hypothesis: C(2)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(2)		-2.02E-05	4.73E-06
Restrictions are linear in coefficients.			

Since the t-stat, f-stat and chi-square statistics probability value are less than 0.05 or 5%. Therefore, we conclude that total expenditure on health has a singleton significant impact on economic growth.

Granger Causality Test

Correlation does not necessarily imply causation in any meaningful sense of that word. The econometric graveyard is full of magnificent correlations, which are simply spurious or meaningless. Economists debate that correlations are less obviously meaningless.

The Granger (1969; Greiner 2005) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. “X” is said to be Granger-caused by “Y” if it helps in the prediction of “X”, or equivalently if the coefficients on the lagged’ “X”s are statistically significant. Note that two-way causation is frequently the case; “X” Granger causes “Y” and “Y” Granger causes “X”.

Eviews runs bivariate regressions of the form:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \ldots + \alpha_l y_{t-l} + \beta_1 x_{t-1} + \ldots + \beta_l x_{-l} + \in_t$$

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \ldots + \alpha_l x_{t-l} + \beta_1 y_{t-1} + \ldots + \beta_l y_{-l} + \mu_t$$

$$\beta_1 = \beta_2 \ldots = \beta_1 = 0$$

Therefore, the granger causality test was used to test the econometric relationship between variable under consideration. Null hypothesis state that X does not granger cause y while alternative hypothesis against it, Decision rule state that if the probability value is less than 0.5 reject H_0 if otherwise do not reject.

Table 6: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	**Decision**
GDP does not Granger Cause EXPHLTH	35	15.7968	0.0004	**Reject H0**
EXPHLTH does not Granger Cause GDP		7.98029	0.0085	**Reject H0**

The result above results shows bidirectional granger causality between GDP and EXPHLTH, this implies that a well performing economy both at individual level and National level will be able to have adequate health status and vice versa this justify the assertion that health is wealth. i.e. GDP granger cause expenditure on Health and health expenditure granger GDP.

Discussion of the Result

The Economic Implication of this result is that all the variables [Health Expenditure (HEXP), Gross Fixed capital formation (GFCF), Inflation rate (INFLARATE) and labour force (TLBF)] contribute greatly to the economic growth of Nigeria. The result also implies that when the government fails to finance health adequately and also fails to attend to improvement of other variables with policy of reducing inflation to one digit figure which is said to be ant-purchasing power. In order to increase healthy living of total labour force or show concern about gross fixed capital formation which will jointly increase the gross productivity in the country, it would lead to an astronomical fall in the economic growth of Nigeria and also discourage sustainable development. This is indicated by having negative intercept of high value unit from the result above. But if the governments increases her expenditure on health, quality of the labour force, as well as formulating health policies for private sectors, there will be improvement in RGDP [Economic growth]. Because to achieve meaningful development, investment in human health is necessary because healthier workers are physically and mentally more energetic and robust, more productive, and earn higher wages (Demirbas, 1999)

A healthy workforce is important when attracting foreign direct investment. Healthier workers are also less likely to be absent from work due to illness in their family. Illness and disability reduce hourly wages substantially, with the effect especially strong in developing countries where a higher proportion of the workforce is engaged in manual labour. Unhealthy workers may not be able to work, but reduce their productivity, shorten their working lives,

and increase the numbers of days lost to illness (Bloom et al., 2004). In Indonesia, for example, anaemic men were found to be 20% less productive than men who were not anaemic. When the anaemic men were treated with iron, their productivity increased nearly to the levels of the non-anaemic men (De la Croix, & Delavallade, (2006). There is also a clear relationship between health and success in education. Healthy children are able to learn better and become better-educated and higher-earning adults. In a healthy family, children's education is less likely to be interrupted due to their ill health of their family.

The result above corroborate the work of Baldacci (2004) in his 'Investment in Human Capital' has agreed that health activities act as the most powerful agent of improving both the quality and quantity of life that the effectiveness of health activities cannot be viewed in isolation from the rest of the planning and development efforts in the country. Also, that of (Agenor, 2007) who argue that the health of the people depends upon the food they eat, the work they do, the knowledge they acquire and the general economic and social conditions, nutrition, occupation, education and other physical and social factors constitute an integral part of the health services.

Conclusion

Based on the above findings, it was established that the nature of causality between government spending on health and economic growth is bidirectional in the channel. Health spending and other related variables were found to be complements and had positive interactive effect on economic growth. Public health has both positive and significant impact on economic growth.

Recommendations

(i) In recognition of the fact that increase in government spending does not automatically lead to increase or improvement in human capital outcomes and even as it is very vital for policymakers and stakeholders to advocate for increased funding of the health sectors; yet concerted efforts should still be committed to funding crucial projects that will culminate to evident outcomes in the health sectors.

(ii) Government would need to establish new partnerships with the stakeholders in private businesses in the sector where its relevance is gradually declining) in order to mobilize the necessary resources to stimulate efficiency. The international organizations should also be contacted for development assistance in conformity with their commitment to African countries.

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