A Generalized Method of Moments Approach of Examining the Impact Public Expenditure on Health and Education Exert on Nigeria's Economic Growth.

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Abstract

This study investigates empirically the relationship between human capital (health and education) expenditure and economic growth in Nigeria using time series data from 1985-2018. We employed the ADF Unit root test and the Generalized Method of Moments technique to account for persistence in the country over time. The estimation results show that the lagged value of Gross Domestic Product Per Capita appears to persist over time. While a positive relationship between Public Education Expenditure Per Capita (PEEPC) and GDP Per Capita was established. Unexpectedly, Public Health Expenditure Per Capita (PHEPC) had a negative relationship with the GDP Per Capita, despite the increased Public Health budgetary allocation in Nigeria. Evidently, the contribution of Health to the Gross Domestic Product is marginally low. Therefore, the study recommends that policymakers should sustain and strive to increase spending on education to meet up with the UNESCO budget recommendation of 26%. And also put in place an effective public financial management system that will reduce leakages and guarantee proper utilization of budgetary allocations on Health and Education.

Keywords: Human Capital, Public Health Expenditure, Public Education Expenditure, Economic Growth.

INTRODUCTION

Across the globe, there is a strong economic case for the governments of developing countries to increase their public expenditure on health and education. Perhaps, this makes them not to perceive health and education as by-products of economic growth but as decisive determinants of economic growth. This is anchored on the fact that the main objective of the government is spending its resources on the economy is basically to achieve certain macro-economic objectives that will propel economic growth and to a large extent development. In pursuant to achieving this broad goal, it is certain that the government will need a healthy, productive, active and, educated workforce, in other words, any investment centered on health and education will in turn enhance economic growth. This scenario is further justified by the views of Bloom and Canning (2005) and Akram et al (2008) that human capital plays a major role for sustainable economic growth, and that public expenditure on health and education are essential constituents of human capital expenditure that enhance workers productivity through improved wellness and capacities.

The Human Development Report 2009 accordingly reflected studies that have shown that investment in human capital is necessary for the sustenance of economic growth over a period. By using the data on economic output and human capital across countries from 2000 to 2005 which indicates a positive correlation between the level of economic output and human capital measured by the combined indexes of education and health in the Human

Development Index (HDI). Human capital is commonly seen to include knowledge and skills acquired through education and training, however, it also includes people's strengths and vitality which are dependent on good health. On a broader note, human capital mostly focuses on health and education as inputs to economic growth.

The role of education and health in advancing economic growth in Nigeria is premised on the increased sophistication and application of knowledge. This is further justified by the World Bank Report (2008) that education and health capitals are the two major instruments in the construction of a knowledge economy. None the less, the evidence of improved educational and health systems in Nigeria is not yet visible, as a result of low budgetary provisions. This therefore, constitutes a problem which this study seeks to investigate the extent and nature to which public expenditure on health and education that will propel the desired economic growth.

The central research aim of this study is to apply the Generalized Method of Moments Approach of Examining the Impact Public Expenditure on Health and Education Exert on Nigeria's Economic Growth, using time series data covering the period 1985-2018. More specifically, the following specific research objective is to be achieved: to examine the nature and extent of the relationship between Public Education Expenditure Per Capital and Gross Domestic Product Per Capita: to examine to what extent does the public Health Expenditure affect Gross Domestic Product Per Capital.

The remainder of our study is structured as; section 2 theoretical frameworks, section 3 review of related literature, and section 4 methodology and data, while sections 5, 6, 7, 8 entail estimation techniques and results, discussion of findings, conclusion and recommendation respectively.

LITERATURE REVIEW
Theoretical Framework

The theoretical framework of this study is anchored on the theories of economic growth which include theory of human Capital formation, Neo-Classical Growth Theory and Endogenous Growth Theory.

The Theory of Human Capital Formation is an offshoot of the theory of capital formation which is deeply rooted in the views of Ragnar, Nurkse, and Simon Kuznets. Both came to the common ground that capital formation stimulates economic growth and that capital is accumulated through investment in capital goods and intangible goods like a high standard of education, health, scientific tradition, and research. Nurkse and Ragnar (1961) stated that governments of developing countries need to make huge investments across all sectors, including education, health, and research. This will expand market size and raise productivity. While Kuznets is of the view that capital formation cannot be determined alone by the accumulation machinery but by the inclusion of the human element which represents investments in health, education, etc, and supports the fact that humans are the agents that propel development in any economy.

Accordingly, Kuznets added domestic capital formation would not only comprise additions to constructions, equipment, and inventories within the country, but also other expenditures that are human capital in nature that are necessary to sustain outputs at existing levels. It would include outlays on education, recreation, and material luxuries that contribute to the greater health and productivity of individuals and all expenditure by the society that serves to raise the morale of the employed population.

In a similar manner, Ashtoon et al (2002) added that human capital formation is helpful in the growth process by encouraging the growth of some other factors especially investment in

physical capital which is considered necessary for the country. It is considered that human capital has a positive link with physical capital.

Also, Javed et al (2013) held that the human capital of a nation is seen from the perspective of health, education, and life expectancy of the populace. Education and health are closely related components of the human capital that work together to make individuals more productive. However, improving the quality of education and health is not an end itself but it affects positively the future growth prospects of the country.

The theory of human capital formation strengthens the fact that quantum of education and health systems investments in capital goods such as infrastructure, machinery, and equipment are relevant for economic growth. Human capital over the years is a vital factor in the production of education and health services.

Neo-classical growth theory, developed by Robert Solow and Irevon Swan in 1950 and Solow 1956; Cass 1965, Koopmans 1965, Ramsey (1928) and Barro and Sala-1 Martin (1956) emphasized that the accumulation of physical capital and spending on education and health were seen as a drain on the accumulation of the productive assets.

The Neo-classical growth model shows that as the capital stock increases, the growth of the economy slows down. Only technological progress keeps the economy growing and it is exogenous to the system.

Solow recognized that the inputs of physical capital and labour, did not explain information relevant to understanding the size, strength and growth potential of a particular economy, building on pioneering work that acquired into the effects of technological progress on the economy, Solow conceived that a greater portion of economic output is dependent on the rate of technological progress of the economy of question.

Endogenous Growth Theory, following the shortcomings of the Solow model, Romer (1986) and Lucas (1988) attempted to 'Endogenize' the sources of growth, with the aim that the rate of growth would be determined within the model. The scholars of this time introduced new theories of technological discovery and adapt to the accounted spillover effects.

This theory allowed economists to argue that technological causes increase return to scale; capital can be utilized in ever more efficient ways. Neither does this counterbalance the diminishing returns and allows theoretically limitless growth possibilities. The new economic theory discoveries allowed economist to properly understand and explain the "how" of growth.

The endogenous growth literature has produced two distinct approaches on how to incorporate human capital into models of economic growth, Schutt (2003). The first is due to Lucas (1988), regards the accumulation of human capital as the engine of growth.

The second approach emphasis the roll of human capital stock in the process of innovation and adoption of new technology, according to Romer (1990).

Endogenous growth theories bring forward the idea that endogenous conditions like human capital, foreign trade policies, financial development and public expenditure of a country can affect economic growth.

Becker (1993) puts that according to the endogenous theory educated, skilled and healthy workers will be more productive and also be able to use the capital and technology more efficiently, which implies that technology and human capital are endogenous to the system.

Empirical Literature

The empirical literature review section sequels the theoretical framework. The quest to prove that relationships exist between human capital expenditures and economic growth has gained the attention of numerous researchers.

Umaru (2011) investigated the relationship between public expenditure on education and health on the growth and development of the Nigerian Economy within the period 1977 to 2007. The Augmented Dickey-Fuller test was applied to examine the unit root property of the series and also a Johansen co-integration test. It established that a long run relationship exists between the variables under study. The study further justified that improvements in government expenditure on human capital boasts economic growth and development.

Sankey at el (2010) investigated empirically the impact of human capital development and economic growth of Nigeria using the Johansen Co-integration and vector error correction analysis. They revealed that investments in human capital in the form of education and capacity building through training and orientation impact positively on economic growth in the long run.

Olabisi and Funlayo (2012) explored the relationship between the composition of public expenditure and economic growth in Nigeria during the period 1960-2008 using the Vector Auto regression model (VAR) and found that expenditure on health enhanced economic growth. Similarly, Ijaija & Ijaiyi (2004) studied on how financing human capital development can boast economic growth using time series data from 2002-2015 and revealed that human capital is highly imperative to economic development and human capital development through the provision of health care services and education increases productivity, per capital income, expansion of knowledge and ultimately reduces poverty.

Bloom, Canning and Sevilla (2004) studied the effect of Health on economic growth using the production function approach which includes two variables namely work experience and health and found that good health has a positive, sizable and statistically significant effect on aggregate output.

Ertekin (2005) studied on how public spending on human capital in major industrialized countries and revealed that human capital is important for firms and nations in the knowledge based economy that needs skills. Thus, investment in education is a public policy to support human capital formation and offset the magnitude of capital loses. Likewise, Sajid, Imran and Fatima (2012) studied the role of human capital formation in economic growth in Pakistani by using the secondary data for the period 1971 to 2010. The results implied that education enrolment (proxy of human capital), health and physical capital are critical components that enhance economic growth in Pakistani. They further justified that human capital, fixed capital and employed labour force also affect the GDP and results in unidirectional and non-directional causality.

Bloom and canning (2005) compared the estimated effects of health in a macroeconomic production function model of economic growth with the effects that are found using calibration based on wage regressions and found that the estimated macroeconomic effects of health are positive.

Javed at el (2013) in their study on the impact of human capital development on economic growth in Pakistani: a public expenditure approach. The study indicated that expenditure on health have positive and statistically significant effects on economic growth. While expenditure on education also have a positive and significant long run impacts. The study further justified that there is higher trajectory of growth by investing in people in terms of Health and education.

Kesilolu and Ozturk (2013) empirically tested the relationship between human capital and economic growth. According to the findings covering the period of 1999-2008 for 20 OECD

countries that are selected by the panel causality test, a bidirectional causality relation revealed that education and health are accepted indicators of human capital.

Bloom et al (2004) estimate a production function of aggregate economic growth as a function of capital stock, labour and human capital (education, experience and health). Their main result was that health has positive, statistically significant effects on economic growth. They however, do not consider how health is created.

The distinctiveness of this research is premised on the point both human capital and endogenous growth theories are adopted, which holistically capture the central objective of the study. This is quit a deviation as most studies on the relationship between human capital and economic growth are based on the neoclassical growth theory, which identifies the sources of economic growth with technology and increase in population as external factors in the model.

METHODOLOGY
Data
The data used for the study is secondary nature and it's obtained from the publication of the 2019 Central Bank of Nigeria (CBN) Statistical Bulletin, covering form 1981 to 2018. While the Nigerian population projection figure 195.9 million was sourced from World Bank.

Model Specification and Variable Construction
The primary objective of this study is to apply the Generalized Method of Moments Approach of Examining the Impact Public Expenditure on Health and Education Exert on Nigeria's Economic Growth. The model specified is based on the assumption that total health expenditure per capita, total education expenditure per capita has positive causal relationship with economic growth. According to Romer (1990) and Barro (1991) in their empirical model incorporated the impact of Human Capital as an important factor in determining Economic Growth, separated Human Capital in Health Human Capital, Education Human Capital and adopting:

Y = f (K, E, H, Z) *where Y is per capita GDP, E is Education Human Capital, H is Health Human Capital while Z is explanatory variables.*

Following their model, the researchers adopted their formulation with modification that strengthens our functional form on which our econometric model is based:

This can be specifically stated as follows:

$$GDPPC = F (PEEPC, PHEPC) \tag{1}$$

Where:
GDPPC is Gross Domestic Product Per Capita
PEEPC is Public Education Expenditure Per Capita
PHEPC is Public Health Expenditure Per Capita

The above model is specified linearly in the form of an equation as follows:

$$\left(\frac{GDP}{Population} \right) = F \left(\frac{PEE}{Population} \right), \left(\frac{PHE}{Population} \right) \tag{2}$$

$$GDPPC_t = \beta_0 + \beta_1 GDPPC_{t-1} + \beta_2 PEEPC_t + \beta_3 PHEPC_t + U_t \tag{3}$$

Where:
$GDPPC_t$ is Gross Domestic Product Per Capita
$GDPPC_{t-1}$ is lagged value of Gross Domestic Product Per Capita
$PEEPC_t$ is Public Education Expenditure Per Capita
$PHEPC_t$ is Public Health Expenditure Per Capita
β_0 is the slope

β_1, β_2, β_3 are the coefficients

Ut is the error or stochastic term

The a'priori expectation of the coefficients of the model are:

$\beta1 > 0$, $\beta2 > 0$, $\beta3 > 0$

Variable Construction

Gross Domestic Product is measured by real GDP. The variable of Public Health Expenditure Per Capita is measured by total government expenditure on health against the population. While the variable for Public Education Expenditure Per Capita is measured by total government expenditure on education against the population.

Education and Health on Economic Growth

The importance of education in economic growth has been empirically confirmed, hence public investments in education is a public policy to support human formation. The above is supported by the study of Loening (2005) based on the Guatemala economy, which established education has a positive and significant impact on economic growth. In economic theory there exist a two-way relationship between health and economic growth. Barro and Martin (1995) confirmed that economic growth has a positive, significant and reasonable influence on life expectancy and some other related health indicators. This is further justified by Naeem, Ihtshaun and Muhammad (2007) there exist a two-way relationship between better health and economic growth. While per capital GDP is caused by increased productivity of existing resources accumulation.

Estimation Techniques

Unit Root Test

A time series is stationary, if its mean, variance and auto-covariance remain the same no matter at what point we measure them. A stationary process will not drift too far away from its mean value because of the finite variance; this is not the case with non-stationary stochastic processes. A non-stationary series will have a time-varying mean or a time varying variance or both. Since we are using time series data set for the analysis, it is important we first subject the data set for stationarity properties. The unit root test of ADF is one of the most widely used stationarity or non-stationarity approaches to data analysis over the years. It examined the stationary properties of the data set we applied the Augmented Dickey-Fuller unit root test. In econometric wise, the testing procedure for the ADF test and the Dickey-Fuller test are similar and it is mathematical stated as:

$$\Delta y_t = \alpha + \beta t + \tau y_{t-1} + \delta_1 \Delta y_{t-1} + ... + ... + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t \qquad (4)$$

Where: α is a constant, and β is the coefficient on a time trend while p is the lag order of the autoregressive process.

Putting the constraints $\alpha = 0$ and $\beta = 0$ corresponds to modeling a random walk and using the constraint $\beta = 0$ corresponds to modeling a random walk with a drift.

By including lags of the order p the ADF formulation allows for higher-order autoregressive processes. This means that the lags length p has to be determined when applying the test. One possible approach is to test down from high orders and examine the t-values on coefficients. An alternative approach is to examine information criteria such as the Akaike information criterion, Bayesian information criterion or the Hanna-Quinn information criterion. The unit root test is carried out under the null hypothesis $\tau = 0$ against the alternative hypothesis of $\tau < 0$.

$$DF\tau = \frac{\tau}{SE(\tau)} \qquad (5)$$

Once a value for the test statistic is computed it can be compared to the relevant critical value for the Dickey-Fuller Test. If the test statistic is less (this test is non symmetrical so we do not consider an absolute value) than the (larger negative) critical value, then the null hypothesis of $\tau = 0$ is rejected and no unit root is present.

The Generalized Method of Moments (GMM)
The Generalized Method of Moments accounts for the dynamic process of handling autoregressive properties in the dependent variables when lagged values are introduced as explanatory variables. In addition, GMM allows the use of instrumental variables which produce more precise and accurate estimators. This method helps to overcome the endogeneity problem, which might arise because Gross Domestic Product Per Capita, Public Education Expenditure Per Capita and Public Health Expenditure Per Capita may be simultaneously determined. However, the Ordinary Least Square (OLS) estimator would yield inappropriate results if there is endogeneity in the model.

The system-GMM estimator treats this system as a single-equation estimation problem. The estimator is called System-GMM because it combines the moment conditions for differenced model with those for the levels model. Windmeijer (2005) proposed a method that the estimated asymptotic standard errors of the efficient two-step robust system-GMM are severely downward biased in small samples and thus we correct for this bias by using the Windmeijer method. He observed that part of this downward bias is due to extra variation caused by the initial weight matrix estimation. In addition, system-GMM solves the endogeneity problem because of the lagged valued of the dependent variable. The instrument used in the system-GMM estimator will be valid only if there is no correlation between instruments and error term. To check the validity of the instruments we use the Hensen-J statistic, which tests the over-identifying restrictions, under the null hypothesis that the instruments are uncorrelated with the error term (i.e. instruments are valid). Windmeijer provides two forms of bias corrected standard errors; one for GMM models estimated in one step (one optimal weighting matrix) procedure and the other using an iterate-to-convergence procedure. The corrected variance-covariance matrix of one-step estimator is given by:

$$V_{W2Step} = V_1 + D_{2s}V_1 + V_1D_{2s}' + D_{2s}V_2D_{2s}' \qquad (6)$$

Where
$V_1 = \ddot{A}^{-1}$ is the estimation default covariance estimator
$W_{2T} = \c{S}_T(\beta_1)$ is the updated weighting matrix (at final parameter estimates)
$V_2 = \ddot{A}^{-1}\ddot{\beta}\ddot{A}^{-1}$ is the estimation updated covariance estimator where $\dot{S} = \c{S}_T(\beta_1)$
$W_{1T} = \c{S}_T(\beta_0)$ is the estimation weighting matrix (at initial parameter estimates)
$W_{0T} = (\o^2\ Z\ Z\ /\ T)$ is the initial weighting matrix
$\Theta W_{j-1} = \eth W^{-1}_{1T}\ /\ \eth\beta_j$
D_{2S} is a matrix whose jth column is given by $D_{2S,j}$.
The Windmeijer iterate-to-convergence variance-covariance matrix is given by

$$V_{WIC} = (1 - D_C)^{-1}\ V_C\ (1 - D_C)^{-1}$$

Where:
$V_C = (\nabla\mu(\beta)\ ZW^{-1}_{CT}Zu\ (\beta))^{-1}$ is the estimation default covariance estimator
$W_{CT} = \dot{S}_T\ (\beta)$ is the GMM weighting matrix at converged parameter estimates.

Estimation Results
Table 2: ADF Unit Root Test Result

Variable	ADF Statistics	Critical Value 5%	Prob. Value	Decision
GDPPC	-3.521644	-2.945842	0.0130	1(1)
PEEPC	-4.907389	-2.945842	0.0003	1(1)
PHEPC	-6.382543	-2.948404	0.0000	1(1)

Source: Author's Eview 9 output 2020

The results of the Augmented Dickey-Fuller (ADF) in Table 2 shows that all the variables were stationary at first difference (integrated of order one i.e. 1(1)). The decision was that since the ADF statistic is more negative than the critical values, at 5 percent level, the null hypothesis of a unit root in the test regression residuals is strongly rejected.

Generalized Method of Moment Estimation Results
The GMM estimation result (Table 3) reveals that R-square's the predictor variables jointly account for approximately 98.71 percentage changes in the level of Nigeria's Gross Domestic Product Per Capita (GDPPC), being the criterion variable. In other words 78.71 percent of the total variation in economic growth is caused by the explanatory variables while the remaining 21.29 percent is due to factors outside the model but covered by the error term.
The Hansen's J or the J-test test shows no evidence of over identifying restrictions as the prob. values of *J* statistics is insignificant in the model. Durbin-Watson statistics (2.27) has no sign of auto-correlation.

The estimation results show that the predictor variable on the lagged gross domestic product per capita (GDPPC-1) is positive and statistically significant, which indicates a positive and significant degree of persistence, therefore showing the presence of low speed of adjustment in the economy. On the other hand, it shows the relationship between current gross domestic products per capita and lagged gross domestic product per capita.

However, the coefficient for lagged value lies between 0 and 1; therefore a value closer to 0 indicates a high speed of adjustment and that the economy is highly competitive, while a value closer to 1 indicates a very low speed of adjustment, suggesting that the economy might be uncompetitive. Finally the lagged GDPPC coefficient value is approximately 0.99, i.e. closer to 1, indicating that gross domestic product per capita (GDPPC) seem to persist perfectly in the country with very low speed of adjustment cost.

Table 3: Generalized Method of Moment Results
Dependent Variable: GDPPC
Method: Generalized Method of Moments
Date: 05/19/20   Time: 12:55
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed
        bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: GDPPC GDPPC(-1) PEEPC PHEPC
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPPC(-1)	0.968763	0.045693	21.20165	0.0000
PEEPC	31.45159	14.14755	2.223112	0.0330
PHEPC	2.531664	17.27333	0.146565	0.8843
R-squared	0.987106	Mean dependent var		133386.7
Adjusted R-squared	0.986348	S.D. dependent var		194466.9
S.E. of regression	22722.07	Sum squared resid		1.76E+10
Durbin-Watson stat	2.274783	J-statistic		1.337029
Instrument rank	5	Prob(J-statistic)		0.512469

Source: Author's Eview 9 output 2020

While the amount for public education expenditure per capita (PEEPC) is significantly related to Gross Domestic Product Per Capita (GDPPC) at 5% level of significance over the study period; on the other hand, the amount of public expenditure on health is not significantly related to the criterion variable (GDPPC). Again, there exists an expected positive relationship between the amount of public education expenditure (PEEPC) and Gross domestic Product Per Capita (GDPPC). This means that as more expenditure on public education, the level of Gross Domestic Products increases. This is in contrast with the negative sign on public health expenditure, which implies a negative relationship with Gross Domestic Product Per Capita.

Discussions of Findings
To account for economy persistence, we use the GMM technique which shows that the lagged gross domestic product per capita variable is positive and significant, indicating that the economy is likely to persist over time.
The GMM results also confirmed that public education expenditure per capita has a positive and significant (at 5% level) effect on the economy which implies that increasing public expenditure with regards to education will impart positively on the economy. This is in line with economic theory and further agrees with the studies carried out by Abbas and Foreman Pack (2008) on Human Capital and Economic Growth in Pakistani: 1960-2003.

With regards to the control variables, the regression results suggest public health expenditure per capita has a negative and significant effect on economic growth. This is due to the leakages in health related spending and capital flight with respect to medical tourism which could be justified by the fact that the rich access medical care abroad. Durbin-Watson statistics (2.27) which is within the traditional benchmark shows no presence of auto correlation.

Conclusion

The study examines how public expenditure on education and health influence Economic growth. The findings typically showed that Public health Expenditure Per Capita does not influence GDP Per capita while Public Education Expenditure Per Capita exceptionally indicated a positive influence on GDP Per capita. Finally, it could be stated that changes in the Public education Expenditure Per Capita really do exert positive and significant influence on the economy.

Recommendation

The study revealed that human capital expenditure on education has impact on economic growth, therefore Nigeria should strive to increase spending on education to meet up with the UNESCO budget recommendation of 26%; Government should create a conducive environment that will ensure macroeconomic stability thereby encouraging the private sector to increase investment in human capital; the finding equally revealed that the public health expenditure does not impact on economic growth, hence, government at all levels should ensure that capital and recurrent expenditure on health is effectively utilized with the view to raising the gross domestic product; it is evident from our findings that monies expended on health did not yield the corresponding effect on the economy. Hence, government should promote fiscal discipline by ensuring that all public expenditure leakages are curtailed placed a restriction on medical tourism; Policy makers should increase capital spending (investment) in health and education.

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APPENDIX

Table 1: Per Capita Values of real Gross Domestic Product, Public Education Expenditures and Public Health Expenditure

PERIOD	Gross Domestic Product Per Capita	Public Education Expenditure Per Capita	Public Health Expenditure Per Capita
1981	481.5	0.87	0.41
1982	515.63	0.97	0.51
1983	561.84	0.82	0.41
1984	593.53	1.02	0.51
1985	687.01	1.33	0.66
1986	687.1	1.33	0.66
1987	985.84	1.17	0.2
1988	1,344.02	7.45	2.14
1989	1,951.31	15.36	2.96
1990	2,412.70	12.25	2.55
1991	2,785.46	6.43	3.16
1992	4,468.31	1.48	0.77
1993	5,562.43	45.33	19.75
1994	7,144.99	37.67	10.67
1995	14,841.03	49.77	16.95
1996	20,583.46	58.7	15.42
1997	21,384.63	75.8	19.86
1998	20,364.73	69.37	24.2
1999	23,885.72	222.61	84.94
2000	34,270.42	295.87	77.69
2001	35,197.54	203.57	125.2
2002	39,794.58	411.08	207.4
2003	50,604.99	330.68	169.8
2004	58,249.45	390.66	174.6
2005	74,583.37	422.66	284.1
2006	94,765.67	607.55	317.8
2007	105,448.28	769.68	418.1
2008	124,024.14	837.06	501.4
2009	126,565.79	699.95	460.4
2010	278,776.23	871.87	505.9
2011	321,492.58	1714.14	1183
2012	366,074.20	1778.46	1010
2013	408,844.12	1992.96	918.8
2014	454,536.09	1754.72	1000
2015	480,576.62	1659.98	1316
2016	518,067.84	1731.9	1025
2017	580,495.41	2062.07	1252
2018	652,182.49	2375.19	1513

Sources: *Data for GDP, Public Education Expenditure and Public Health Expenditure were source from Central Bank of Nigeria, Statistical Research Bulletin, 2018.*
Note: *Authors' Computation of Per Capita Values of GDP, Public Education Expenditure and Public Health Expenditure was obtained from World Bank; United States Census Bureau -2018-Nigeria Population figures of 195.9 million.*

ADF Unit Root Test for GDPPC
Null Hypothesis: D(GDPPC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.521644	0.0130
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPPC,2)
Method: Least Squares
Date: 05/19/20   Time: 13:31
Sample (adjusted): 1983 2018
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPPC(-1))	-0.577314	0.163933	-3.521644	0.0012
C	11291.75	5356.598	2.108008	0.0425

R-squared	0.267273	Mean dependent var	1990.360
Adjusted R-squared	0.245722	S.D. dependent var	32194.90
S.E. of regression	27961.01	Akaike info criterion	23.36896
Sum squared resid	2.66E+10	Schwarz criterion	23.45694
Log likelihood	-418.6413	Hannan-Quinn criter.	23.39967
F-statistic	12.40198	Durbin-Watson stat	2.220626
Prob(F-statistic)	0.001245		

ADF Unit Root Test for PEEPC
Null Hypothesis: D(PEEPC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.907389	0.0003
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PEEPC,2)
Method: Least Squares
Date: 05/19/20   Time: 13:43
Sample (adjusted): 1983 2018
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PEEPC(-1))	-0.857207	0.174677	-4.907389	0.0000
C	57.77489	31.18032	1.852928	0.0726

R-squared	0.414625	Mean dependent var	8.695000
Adjusted R-squared	0.397408	S.D. dependent var	228.2679
S.E. of regression	177.1970	Akaike info criterion	13.24635
Sum squared resid	1067558.	Schwarz criterion	13.33433
Log likelihood	-236.4344	Hannan-Quinn criter.	13.27706
F-statistic	24.08246	Durbin-Watson stat	1.943250
Prob(F-statistic)	0.000023		

ADF Unit Root Test for PHEPC
Null Hypothesis: D(PHEPC) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.382543	0.0000
Test critical values: 1% level	-3.632900	
5% level	-2.948404	
10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PHEPC,2)
Method: Least Squares
Date: 05/19/20   Time: 13:46
Sample (adjusted): 1984 2018
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PHEPC(-1))	-1.811859	0.283877	-6.382543	0.0000
D(PHEPC(-1),2)	0.417939	0.176537	2.367428	0.0241
C	69.54015	25.44324	2.733149	0.0101

R-squared	0.672321	Mean dependent var	7.477429
Adjusted R-squared	0.651841	S.D. dependent var	237.7067
S.E. of regression	140.2589	Akaike info criterion	12.80667
Sum squared resid	629521.7	Schwarz criterion	12.93999
Log likelihood	-221.1168	Hannan-Quinn criter.	12.85269
F-statistic	32.82824	Durbin-Watson stat	1.921797
Prob(F-statistic)	0.000000		