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Human Capital Development and Nigerian Economy in long-Term Perspective: Empirical Evidence

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ABSTRACT

Economic development is characterized by a reduction in poverty, a reasonable rate of employment, equality in distribution of national resources and wealth; which all culminate to enhanced standard of living in general. For the past four decades, the role of human capital in the achievement of economic development has been at the centre stage of discourse amongst development economists. In spite of both the theoretical foundations and empirical evidence for the contributions of human capital to the economy, the empirical linkage especially for Nigeria is yet to be settled and thus remain inconclusive. This has been partly linked to variations in the study periods, as well as the difference in methodologies adopted. This study therefore contributes to the literature by empirically investigating the long run relationship between human capital and economic development in Nigeria within the framework of autoregressive distributed lag model. Adopting the bounds testing approach of the autoregressive distributed lag (ARDL) technique, the relationship between GDP per capita and measures of human capital development such as gross enrolment ratios at the three levels of education subsisting in Nigeria are examined. Also due to the imperative of government policy through her investments in developing human capital as noted by the endogenous growth theorists, measures such as total government expenditure on education and health are relevant in Nigeria context and are therefore incorporated into the research. The results of the study reveal that most of the human capital variables adopted except government health expenditure are statistically insignificant in explaining economic development. Following from the findings, it is suggested that measures that will enhance quality human capital formation through skills acquisition in order to ensure labour productivity, job creation and sustainable economic development should be encouraged by the stakeholders. Furthermore, proper institutional framework which ensures effective, quality and efficient utilization of government resources allocated to both the education and health sectors should be pursued with vigour and put in place.

1. INTRODUCTION

The failure of economic growth to deliver on sustainable economic development and improved standard of living especially in most developing economies of the world, as hypothesized by the early theories of growth (that is, especially the classical and the neoclassical theories) has led the contemporary theorists to shift focus in favour of measures that will solve the contemporary challenges of development.

One of such measures is the development of human capital. Human capital according to Harbison (1962) refers to the abilities and skills of human resources while human capital development is the process of acquiring and increasing the number of persons who have the skills, education, and experience which are critical for the growth and development of a country. Achievement of this can be made possible through adequate investments in the two

critical and social sectors of the economy (i.e. education and health). Barro (1991); Adedeji and Bamidele (2003) noted that the impressive performance of the economies of most of the developed and the newly industrializing countries as generally agreed can be linked amongst others, to an impressive commitment to human capital formation.

Neoclassical theories (especially Solow growth theory) associated the growth in productivity and hence, long run economic growth to physical capital, and exogenously determined technology (i.e. technology determined from outside of the economic environment). Experience however has shown that human beings are the most important and promising means of achieving growth in productivity, economic growth and development, and not physical capital like equipment and exogenous technology as earlier proposed. Hence, developing the value and quality of the human factor through education and health, with the aim of achieving growth and development cannot be over-emphasized.

Ever since the work of Schultz (1961), studies on the role of human capital on the economy have continued to gain ground and much importance. In recent times, the topic has emphasized new growth theory (Romer, 1986; Lucas, 1988; Barro & Sala-i-Martin, 1995) where human capital is analyzed to be endogenously determined (i.e. developed within the economic system). Technically advanced human capital and a growing knowledge base can in the long run increase output per unit. Thus, important implication of Lucas' hypothesis on human capital is linked with investment in man and his development as a creative and productive resource (Harbison, 1962).

Economic development no doubt is a good determinant of economic welfare and an enhanced standard of living. Considering the high rate of population growth in the developing countries, quality and persistent development of its human capital is particularly important to achieve high labour productivity and particularly, reduced unemployment necessary for achieving economic development. This is due to the need to extract a large proportion of the population from the jaws of abject poverty thereby setting the nation on the path of rapid economic development. Ranis and Stewart (2001) observe and support the fact that labour productivity is the outcome of a significant relationship between economy and human development. Schultz (1992), even Bloom and Canning (2000; 2003) in their studies separately identify population quality as the decisive factor of production which only adequate investments in education and health can ensure.

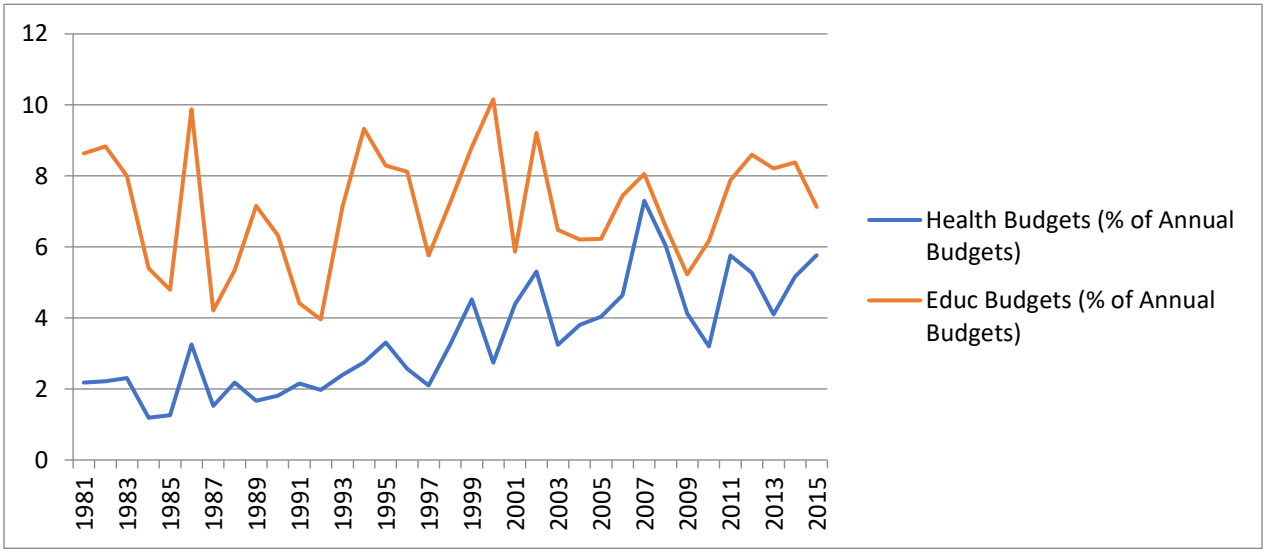
Literature is replete with studies on economics of human capital especially, in Nigeria amongst which are that of Adamu (2003); Ogujiuba and Adeniyi (2005); Babatunde and Adefabi (2005); Lawanson (2009); Dauda (2010); Adawo (2011); Aderemi (2014); Okoro and Eyenubo (2014); Olunkwa (2014). In spite of the fact that they have provided both theoretical and empirical foundations for the contributions of human capital to the economy, the empirical linkage in Nigeria is yet to be settled and thus remain inconclusive. The debate continues as there is no consensus yet on the role of human capital in raising people's standard of living which may be linked to the differences in study periods, as well as the methods of analysis adopted. Suffice to say that the results from past studies have presented diverse outcomes hence, the need for further study to investigate the short run and long run effects of human capital investments on economic development in Nigeria, spanning 1981 to 2015. The rest of the paper is structured as follows: Section 2 briefly reviews related literature; section 3 discusses the methodology (that is, theoretical framework, model specification and estimation procedure); section 4 presents and discusses the empirical results; while section 5 concludes the paper with policy implications.

2. LITERATURE REVIEW

Empirical studies on economic growth predicated on the neoclassical model particularly that of Solow (1956) focused on exogenous technical factor that determines output-input ratios. This approach to growth pays little or no attention to human capital development. Yet, evidence of a close link between investments in human capital and the economy is quite strong. Abbas (2001) noted that investment in human capital has been a major source of economic growth in the advanced countries, while the negligible amount of human investments in underdeveloped countries has done a little to extend the capacity of people to meet the challenge of accelerated development. The education and health sectors in Nigeria have mostly been confronted with poor level of government commitment which is manifested in the poor budgetary allocations to the sectors. For instance, government expenditure as a proportion of total expenditure only averaged 7.13% during the study period, well below the UNESCO recommendations of 26% of annual budgets, while that of health during the same period is 3.41%. World Health Organization (WHO) however recommends a minimum of 5% annual budgetary allocation to health sector especially in developing countries. This depicts gross underfunding of the sectors which may hinder the development of quality human

capital necessary impacting positively the living standards of the people. Figure 2.1 reveals government's commitment to both the education and health sectors through the trend of budgetary allocations as a proportion of total annual budgets to the sectors in the period under review:

Figure 2.1: Budgetary Allocations (% of Total) to Education and Health Sectors, 1981-2015.



Source: Author's Computation with Data from Central Bank of Nigeria, CBN Annual Report and Statement of Accounts (Various Issues); CBN Statistical Bulletin (2016).

As shown in figure 2.1, allocations to both sectors show a significantly fluctuating trend during the period under review with that of education being remarkable. In fact, budgetary allocation to education peaked at 10.16% (below UNESCO's 26%) in 2000 while allocation to the health sector did not exceed 7.3% and this was in 2007. Not unexpected though given the abysmal low allocations, the performance of the sectors has not been encouraging over the years. For instance, the adult literacy rates in selected countries in 2013 (UNDP, 2013) reveal that Nigeria is ranked low compared with the other countries and even behind Algeria and Tunisia (also developing countries) as shown in Table 2.1:

Table 2.1: Adult Literacy Rates in Selected Countries, including Nigeria as at 2013

Country	Adult Literacy Rates (%)
Bulgaria	98.4
Spain	97.7
Malaysia	93.1
Turkey	90.8
Algeria	72.6
Tunisia	77.6
Nigeria	61.3

Source: UNDP (2013), Human Development Report, HDR

Table 2.2 below shows the allocation to education as a per cent of GNP in 20 selected countries including Nigeria in 2012, reiterating the fact that allocation to the sectors as a measure of level of commitment is a contributory factor to what obtains in Table 2.1. As observed in Table 2.2, allocation to education in Tunisia is 17.0% while in Nigeria; it is only 8.4% of GNP. This may have explained why literacy rate in Tunisia shown in Table 2.1 is higher than in Nigeria thus, emphasizing the fact that development in the sector is a function of government's level of commitment in terms of budget disbursement to it.

Table 2.2: Allocation to Education as per cent of GNP in 20 Selected Countries, including Nigeria as at 2012

Country	Educ. Alloc. (% of GNP)	Country	Educ. Alloc. (% of GNP)
Ghana	31.0	Iran	17.7
Cote d'Ivoire	30.0	USA	17.1
Uganda	27.0	Tunisia	17.0
Morocco	26.4	Lesotho	17.0
South Africa	25.8	Burkina Faso	16.8
Swaziland	24.6	Norway	16.2
Mexico	24.3	Colombia	15.6
Kenya	23.0	Nicaragua	15.0
United Arab Emirate	22.5	India	12.7
Botswana	19.0	Nigeria	8.4

Source: World Bank (2012), Reported in Ige (2016).

Several empirical studies that adopted the model of endogenous human capital to determine the linkage between human capital development and the economy have emerged ever since the rediscovery of the role of human capital in economic development by Schultz (1961). Some are country-specific (Ncube, 1999; Babatunde & Adefabi, 2005; Lawanson, 2009; Dauda, 2010; Anyanwu, Adam, Obi & Yelwa, 2015) while most are cross-national; often seek to explain differences in economic growth rates across countries due to levels of human capital (Barro, 1991; Pritchett, 2001). In these studies, an act that keeps recurring is the use of diverse variables as proxies for human capital accumulation hence, indicating the existence of a measurement problem. Among the variables used include literacy rates, educational spending, school enrolment ratios, mean year of schooling, and so on. This has therefore led to results that are conflicting, mixed and inconclusive. One other reason that may also be attributed to the mixed results observed can be the variations in the length of periods of study adopted by the various researchers.

For instance, the study of 98 countries between 1960 and 1985 using school enrolment rates as measures of human capital by Barro (1991) indicates a positive relationship between initial human capital measured by 1960 school enrolment rates and real per capita GDP. This means that the initial level/stock of human capital is of great importance in explaining the issue of economic development as revealed by the study of Barro (1991) and subsequently, that of its accumulation. Also, in his cross-country study using cross-national data, Pritchett (2001) found a negative and an insignificant association between increases in human capital attributable to the growth in educational capital and attainment of the labour force and the rate of growth of output per worker.

At the country level, Ncube (1999) incorporated a variable of human capital proxied by total enrolment into the standard growth model. His results indicated a very strong long-run relationship between human capital investments

and economic growth in Zimbabwe. Equally, the study of Babatunde and Adefabi (2005) in Nigeria adopted Johansen co-integration technique and the vector error correction model on time series data between 1970 and 2003 to investigate the long run relationship between education and growth. The results established a long run relationship between primary and tertiary enrolment ratios as well as the average years of schooling and output per worker. Also, education expenditure was found to significantly influence growth.

The study of Lawanson (2009) revealed a positive relationship between human capital (proxied by tertiary enrolment and education expenditure) and economic development. The results however indicate a no relationship between health expenditure, primary and secondary enrolments and economic development measured by GDP. The short study period between1983 and 2007 (24 year observation) as well as the use of GDP as proxy for economic development are a source of concern, and may be seen as the flaw of the study. Dauda (2010) on the other hand used real GDP as proxy for economic development. Contrary to that of Lawanson (2009), the results of her study revealed that both the secondary and tertiary enrolments individually show a positive relationship with economic development (that is, real GDP). Precisely, a 1 per cent increase in tertiary and secondary enrolments increases real GDP by 48 per cent and 104 per cent respectively. This further reiterates the fact that the measure used to proxy a variable matters greatly in shaping the outcome of an empirical research.

Anyanwu, Adam, Obi and Yelwa (2015) employed autoregressive distributed lag model to examine the dynamic impact of human capital development indicators on economic growth in Nigeria. The outcome of the study shows that in the long run, majority of human capital development indicators positively impact economic growth within the reviewed periods. However, their impacts are largely statistically insignificant.

In summary, the foregoing review shows conflicting results in the relationship between human capital and economic growth/development especially in Nigeria. Also, most of the reviewed studies scarcely made reference to health as a form and component of human capital development except in few cases. Hence, further study that incorporates both the education and health measures in the same model to contribute to the literature in the area of economics of human capital is considered necessary. This is to avoid estimation bias due to omitted variables and thereby, enhance estimation efficiency.

3. METHODOLOGY

3.1 Theoretical Framework

This study is predicated on Romer (1986) and Lucas (1988) endogenous human capital-growth models. According to the models, continuous and long run growth is endogenously dependent on human capital developed within the economic environment. Thus, public policies play essential roles in evaluating the long run growth process through a substantial government investment in human capital. By implication, the models indicate that human capital is the driving force in the growth process of an economy.

Unlike the neoclassical approach, this pays little or no attention to the role of human capital in engendering long run growth. Neoclassical approach rather emphasizes exogenously-determined technology in enhancing the activities of labour to ensure growth. Romer (1986) version of endogenous model recognizes and aligns with a one-time increase in the stock of human capital to sufficiently augment the rate of economic growth. Lucas (1988) however, in addition to the stock also identifies the rate of accumulation of human capital to speed up the rate of economic growth. This implies that Lucas (1988) recognizes the role of both the stock and accumulation of human capital in economic growth and development. Since human capital embodied knowledge and skills, and economic development depends on advances in technological and scientific knowledge, growth rate and development presumably depend on the accumulation of human capital which is the thrust of Lucas (1988) endogenous growth model. Thus, the basic Lucas model is of the form:

$$Y = AK^{\alpha}(\mu hL)^{\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (1)$$

Expressing equation (1) in per capita terms gives the intensive form in equation (2) as:

$$y = Ak^{\alpha}(\mu h)^{\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where,

$'Y'$ is aggregate output; $'y'$ is output per capita measured by real GDP per capita; $'A'$ is the level of technology; $'K'$ stands for the stock of physical capital measured by gross fixed capital formation; $'\mu h'$ according to Lucas is the stock of human capital; $'L'$ represents labour; $'\mu'$ is the proportion of total labour time spent working; and $\alpha + \beta = 1$ (output based on constant returns to scale in capital and labour).

Since knowledge and skills are accumulated through learning when individuals study (Aderemi, 2014), thus relating economic development proxied by real GDP per capita (y) to human capital accumulation through time spent not working, equation (2) transforms to:

$$Y = AK^{\alpha}(H)^{\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Taking the natural log of equation (3) and introducing the disturbance term to produce the estimable form of the model gives equation (4) as:

$$In\ Y = In\ A + \alpha\ In\ K + \beta\ In\ H\ + \mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

3.2 Model Specification and Data Sources

The model in equation (4) is the theoretical model that defines the relationship between human capital development and economic growth. However, for the purpose of the study and its relevance to Nigeria, the model in equation (4) is modified and expanded to include the human capital development variables of interest. These are the gross enrolment ratios at the three levels of education in Nigeria (i.e. primary, secondary and tertiary levels) to measure human capital accumulation, H. This is done to evaluate the short run and long run impact of each level of education on economic development in Nigeria. Also, government expenditures on education and health are incorporated to examine how government investments through her policies on education and health influence the level of economic development during the study period. This is because government policies through her investments in social sectors like education and health enhance access which positively impacts school enrolment and health, thereby improving human capital, especially in developing countries like Nigeria. The newly modified and expanded model is thus stated in equation (5) as follows:

$$InGDPPC_t = InA_t + \alpha InGFCF_t + \beta_1 InPSE_t + \beta_2 InSSE_t + \beta_3 InTER_t + \beta_4 InGEE_t + \beta_5 InGEH_t + \mu_t \quad (5)$$

Equation (5) in its estimable form translates into equation (6) as follows:

$$InGDPPC_t = \alpha_0 + \alpha_1 InGFCF_t + \beta_1 InPSE_t + \beta_2 InSSE_t + \beta_3 InTER_t + \beta_4 InGEE_t + \beta_5 InGEH_t + \mu_t \quad (6)$$

Therefore, equation (6) forms the operational model specified for the study. Where, $GDPPC$: real GDP per capita is the measure of economic development adopted by the study; $GFCF$: Gross fixed capital formation is the measure of physical capital; PSE, SSE and TER are primary, secondary and tertiary enrolment ratios respectively; GEE: total government education expenditure as a ratio of GDP; GEH: total government health expenditure as a ratio of GDP; α_0: constant term, this represents the level of economic development due to technology (A) when the values of human capital development measures represented in equation (6) remain constant; μ: the disturbance/stochastic error term; the symbols: $'\alpha'$ and $'\beta's$ are the parameters to be estimated; subscript (t) indicates analysis with time-series data; all other variables are as defined earlier. The study period is 1981 to 2015 and sources of data include CBN Statistical Bulletin (2016) and World Development Indicators, WDI (2016). Intuitively, it is expected that all the explanatory variables will have positive effects on the dependent variable (i.e. real GDP per capita).

3.3 Estimation Procedure

Time series of variables in most countries (especially those of the developing economies) usually exhibit the presence of unit roots. In other words, most time series data do not have constant variance thereby making them to be non stationary. The results of estimation conducted on non stationary time series are prone to bias and therefore resulting to spurious regression. Hence, the test for unit roots and order of integration of the variables was first conducted on the time series using the Phillip-Perron (PP) test. This is done to establish the stationarity or otherwise

of the time series. Adebiyi (2003) posits that it is imperative for data involving macro time series to test for unit roots and co integration before a structural relationship is estimated and reported for potential policy use.

Thereafter, co integration analysis was conducted by employing bounds testing approach of the technique of autoregressive distributed lag to establish the nature and extent of the short run and long run relationships between economic development proxied by real GDP per capita and human capital development indicators adopted by the study. The technique of ARDL in the Monte Carlo evidence according to Emran, Shilip and Alam (2007); Menyah and Wolde-Rufael (2010) is said to have several advantages over other conventional methods of co integration. These include: (1) correcting for the possible endogeneity of explanatory variables; (2) ARDL has good properties for small sample estimation; (3) it does not formally require unit root test as it is not affected by the order of integration of the series; and (4) it allows both long run and short run models to be estimated simultaneously. The study therefore stands to benefit important econometric advantages by examining the relationship between human capital investments and economic development within the ARDL framework, more importantly with the adoption of small sample data size of 35 years (1981-2015). Furthermore, the error correction mechanism was engaged to check for deviations in the long run equilibrium relationship between the dependent variable and the explanatory variables. The motive is to establish the short run dynamics of the model. The ARDL framework for the study is represented in equation (7) as follows:

$$\Delta InGDPPC_t = \sigma_0 + \theta_1 InGDPPC_{t-1} + \theta_2 InGFCF_{t-1} + \theta_3 InPSE_{t-1} + \theta_4 InSSE_{t-1} + \theta_5 InTER_{t-1} + \theta_6 InGEE_{t-1} + \theta_7 InGEH_{t-1} + \sum_{i=1}^{a} \delta_i \Delta InGDPPC_{t-i} + \sum_{i=0}^{b} \vartheta_i \Delta InGFCF_{t-i} + \sum_{i=0}^{c} \pi_i \Delta InPSE_{t-i} + \sum_{i=0}^{d} \varphi_i \Delta InSSE_{t-i} + \sum_{i=0}^{e} \gamma_i \Delta InTER_{t-i} + \sum_{i=0}^{f} \partial_i \Delta InGEE_{t-i} + \sum_{i=0}^{g} \omega_i \Delta InGEH_{t-i} + \varepsilon_t \quad (7)$$

Where, σ_0: the drift component; Δ: first-difference operator; $a, b, c, d, e, f, and\ g$: are optimal lag lengths for each incorporated series, which may or may not be equivalent to each other. The appropriate lag length is 2 and selected based on Akaike Information Criterion (AIC) before the estimation of the selected model is conducted.

4. DATA PRESENTATION AND DISCUSSION OF EMPIRICAL RESULTS

4.1 Descriptive Statistics of Variables

The descriptive statistics of the adopted variables by the study are presented in Table 4.1. These show the characteristics of the variables during the reviewed period. As revealed by the table, the mean values for GDPPC, GFCF, PSE, SSE, TER, GEE and GEH are given as 9.533, 12.520, 4.529, 3.361, 1.634, -0.954 and -1.958. The results indicate that gross fixed capital formation (GFCF) exhibits the highest level of growth among the variables in the model. Government health expenditure (GEH) on the contrary reveals the least growth rate of -1.958. The result is further supported by the median values of 8.838, 12.398, 4.496, 3.299, 1.416, -0.713 and -1.715 which shows the highest median value of 12.398 associated with GFCF. The maximum values 13.336, 16.463, 4.726, 3.780, 2.342, 0.030 and -0.654 and their respective minimum values 5.741, 9.083, 4.363, 2.834, 0.837, -3.507 and -3.912 shows that GDP per capita has the widest range of values followed by gross fixed capital formation (GFCF) while PSE indicates the least range of values among all the captured variables in the model. The results of the standard deviation 2.418, 2.391, 0.091, 0.208, 0.469, 0.726 and 0.926 also reveal the highest variability associated with GDP per capita and GFCF. This further illustrates a high degree of variations in economic development and capital formation for investment outlays within the Nigerian economy.

Table 4.1 Summary of Descriptive Statistics

	GDPPC	GFCF	PSE	SSE	TER	GEE	GEH
Mean	9.533821	12.51965	4.528808	3.360673	1.635916	-0.953595	-1.958162
Median	8.837599	12.39793	4.495724	3.298522	1.416438	-0.713350	-1.714798
Maximum	13.33607	16.46255	4.725705	3.780299	2.342290	0.029559	-0.653927
Minimum	5.741385	9.082507	4.362556	2.833717	0.836529	-3.506558	-3.912023
Std. Dev.	2.417909	2.391257	0.091031	0.207674	0.468953	0.726366	0.926270
Skewness	-0.006574	0.204356	0.629443	0.060428	0.236186	-1.335917	-0.436586
Kurtosis	1.663898	1.849241	2.693207	2.757815	1.511031	5.424455	1.879640
Jarque-Bera	2.603622	2.174800	2.448415	0.106837	3.558570	18.98265	2.942387
Probability	0.272039	0.337092	0.293991	0.947983	0.168759	0.000076	0.229651

Sum	333.6837	438.1876	158.5083	117.6236	57.25705	-33.37583	-68.53566
Sum Sq. Dev.	198.7737	194.4157	0.281743	1.466367	7.477177	17.93864	29.17118
Observations	35	35	35	35	35	35	35

Source; Author's Computation, 2019.

Furthermore, the skewness -0.007, 0.204, 0.629, 0.060, 0.236, -1.336 and -0.437 for the respective variables indicates a negatively skewed distribution for GDPPC, GEE and GEH with fewer concentration of positive values towards the peak, while there is positively skewed distribution for GFCF, PSE, SSE and TER with largest concentration of positive values towards the peak. The Kurtosis 1.663, 1.849, 2.693, 2.758, 1.5110, 5.424 and 1.880 indicates a moderately distributed series with more concentration towards the peak, except for government expenditure on education which suggests a platy-kurtosis distribution with value above 3. The Jarque-Bera results of 2.604, 2.175, 2.448, 0.107, 3.559, 18.983 and 2.942 with the corresponding probability values of 0.272, 0.337, 0.294, 0.948, 0.169, 0.000 and 0.230 suggests a normal distribution for the variables, except government education expenditure with low probability value of 0.000 which is less than 0.05 (5%).

4.2 Unit Root Test

The results of the Phillip and Perron unit root test are as presented in Table 4.2 below. As observed from the table, at 1 per cent significance level all the variables with the exception of government education expenditure (GEE) are non stationary at their levels. This therefore reveals the presence of unit roots for the variables at levels. Hence, the null hypothesis of no unit roots is rejected for the variables at levels. However, the series that were non stationary at levels became stationary at their first differencing thus, making the study model to consist of both series that are stationary at level and those integrated of order 1. The outcome of the unit root test justifies the application of the autoregressive distributed lag (ARDL) technique to investigate the short run and long run relationships between the dependent and the explanatory variables.

Table 4.2 Unit root result

Variables	Phillip-Perron (PP) @levels (critical value @ 1% level of significance)	First differenced (critical value @ 1% level of significance)	Order of integration
LGDPPC	0.241041	-6.696460***	I(1)
LGFCF	0.709284	-4.568325***	I(1)
LPSE	-2.121837	-5.29507***	I(1)
LSSE	-2.349027	-7.741854***	I(1)
LTER	-1.338191	-11.60059***	I(1)
LGEE	-3.797724***	-13.32437***	I(0)
LGEH	-1.887538	-7.292762***	I(1)
Critical values	-2.951125	-2.954021***	

Source; Author's Computation; ***represents significance level at 1%

Given the different order of integration of the time series as observed, the study proceeds to employ the bound testing approach of the auto regressive distributed lag (ARDL) technique to first examine if there exists any co integration among the variables. Thereafter, the estimation of both the short-run and long-run relationships among the variables in the model is conducted and the results presented in Tables 4.3 and 4.4. The presence of unit root especially in time series observations make the result of any estimation carried out on such observations to be prone to bias and therefore leading to spurious result. Hence, the series that were not stationary at levels were further transformed at first differencing to achieve a stationary trend process. This makes the study model to consist of both series that are stationary at level and those integrated of order 1. At this instance, it is no longer appropriate to apply

the conventional Johansen and Juselius (1990) maximum likelihood co integration technique. Hence, the study resorts to the utilization of the auto regressive distributed lag (ARDL) method in establishing the nature and extent of the short-run and long-run relationships between economic development proxied by GDP per capita and human capital development measures in Nigeria. The utilization of the ARDL model further offers the study an opportunity to establish the granger causality of the system from its short-run dynamic adjustment to the long run equilibrium state.

Table 4.3 Bounds Testing Co integration Result

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance level.	I(0)	I(1)
F-statistic	5.711414	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source; Author's Computation using E-Views 9

The long run relationship between GDP per capita and human capital development is investigated with the use of bounds testing approach as depicted in Table 4.3. In this approach the F-statistic is compared with the Pesaran, Shin & Smith (2001) critical value at 5 percent and 1 percent significance levels. The lower critical value assumes variables are integrated at order zero while upper critical value assumes variables are integrated at order one process. Thus, F-statistic that falls below the critical value at lower region I (0) suggests there is no co integrated series, an F-statistic between the lower region I(0) and upper region I(1) reveals an inconclusive result while an F-statistic greater than the upper region shows evidence of a co integrated series leading to the rejection of the null hypothesis of no co integration. The result of the bounds co integration testing in Table 4.3 shows that the calculated F-statistic (5.71) exceeds the critical value at upper region at 5 percent (3.28) and 1 percent (3.99) significance level respectively. The outcome of the test thus establishes co integration and the existence of a long-run relationship among the variables in the model. Therefore, the null hypothesis of no co integration is rejected at 1% and 5% significance levels respectively.

Table 4.4 Short-run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LGDPPC(-1))	0.324998	0.175784	1.848843	0.0915
D(LGFCF)	0.326214	0.156365	2.086227	0.0610
D(LGFCF(-1))	-0.393501	0.152258	-2.584436	0.0254
D(LPSE)	-1.309094	0.860604	-1.521135	0.1564
D(LPSE(-1))	-3.957879	0.866982	-4.565124	0.0008
D(LPSE(-2))	1.218746	0.747482	1.630470	0.1313
D(LSSE)	-2.437507	0.563861	-4.322885	0.0012
D(LSSE(-1))	-1.037043	0.588278	-1.762846	0.1056
D(LTER)	-0.234823	0.265709	-0.883759	0.3957
D(LTER(-1))	-0.082612	0.263651	-0.313337	0.7599
D(LTER(-2))	0.893263	0.285093	3.133232	0.0095
D(LGEE)	-0.119764	0.062966	-1.902035	0.0837
D(LGEH)	0.579199	0.077157	7.506776	0.0000
D(LGEH(-1))	-0.417265	0.108012	-3.863153	0.0026
CointEq(-1)	-0.607721	0.181744	-3.343830	0.0065
R-square			F-statistic 350.00	

	0.998434		
Adjusted R-squared	0.995586	Prob (F-statistic	0.0000
		Durbin Watson	2.005013

Source; Author's Computation.

The preliminary test as revealed in Table 4.4 shows the F-statistic 350.00; and p-value<0.01 which establishes the overall significance of the estimated model at 1 percent level. This means that all the explanatory variables are jointly significant in explaining the dependent variable (that is, real GDPPC). The R-squared result also shows that 99.84 percent of variations in economic development is accurately predicted by the variations in the joint explanatory variables in the model, while the Durbin Watson statistic (2.005) revealed no incidence of serial autocorrelation between the error terms and the parameter estimates of the model.

The short-run analysis of the results in Table 4.4 shows that all the variables except the differenced primary enrolment with its differenced lag 2, differenced secondary school enrolment lag 1, differenced tertiary enrolment and its lag1 show a significant relationship with GDP per capita. Notably capital formation, primary school enrolment and health expenditure revealed significant inverse cumulative effect on standard of living measure. In terms of magnitude and direction it could be observed that primary school enrolment has the highest negative impact on GDPPC. Specifically, an increase in primary school enrolment in the previous year shows a retarded effect on GDP per capita. This is also applicable to the result on differenced secondary school enrolment. This therefore implies that increases in primary and secondary school enrolments are not sufficient to positively impact economic development in Nigeria particularly in the short-run period. This may as well place an aspersion on the quality and adequacy of education received at these education levels.

Evidently, previous years of tertiary enrolment account for a significant positive impact on economic development proxied by GDPPC. Specifically, a percent change in tertiary enrolment (differenced lag 2) brings about 89.3 percent changes in economic development. Notably as observed, the variations in school enrolment account for significant changes in GDP per capita in the short-run. Most importantly, the responsiveness of economic development to the variations in primary and secondary education enrolments is observed to be elastic, thus a proportionate change in primary and secondary school enrolments brings about a more than proportionate change in living standard. The analysis of government expenditure reveals that education expenditure has a negative impact on economic development in the short-run. Consequently, it is observed that while health expenditure suggests a significant positive impact on GDPPC, its lag effect does not contribute to the improvement in the economy. This can be attributed to the low level of government's commitment to the sectors responsible for developing human capital through the low proportion of total expenditure allocations to them which hardly hit 10% on an annual basis in Nigeria.

Further analysis of the study results shows that the error correction term is negatively signed, statistically significant and within the magnitude of zero and 1 in absolute terms as expected. The result (-0.6077) of the systemic dynamism from the short-run duration to the long-run equilibrium indicates that 60.77 percent of the imbalance in the system can be corrected per time as it converges to the long run equilibrium state. A relatively high error correction coefficient (in absolute term) indicates a faster full restoration of any distortion in the short run as it converges to its long run state.

Similarly, analysis of the long run estimates of the relationship between human capital and economic development proxied by real GDP per capita in Nigeria from 1981 to 2015 is presented in Table 4.5. The results of the estimated long run coefficients of the model show that capital formation has a significant direct relationship with real GDP per capita. This implies that an increase in gross fixed capital formation suggests a significant improvement in living standards. The detailed analysis of the result shows that a percentage change in gross fixed capital formation brings about a corresponding 80.6 percentage change in living standards holding other variables constant. It is further observed that the degree of responsiveness of GDP per capita to the variations in capital formation is inelastic in the long run. This shows that a percentage change in gross fixed capital formation brings about a lesser percentage change in GDP per capita.

Table 4.5 Analysis of the long-run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGFCF	0.805742	0.077706	10.369066	0.0000
LPSE	-1.679333	1.301546	-1.290260	0.2234
LSSE	0.362281	1.034561	0.350178	0.7328
LTER	-0.977826	0.854464	-1.144373	0.2768
LGEE	-0.197070	0.138779	-1.420033	0.1833
LGEH	1.306627	0.323360	4.040784	0.0019
C	10.001399	5.914890	1.690885	0.1190

Source; Author's Computation.

A close observation of the results in Table 4.5 shows that though primary school enrolment indicates an elastic relationship, while secondary enrolment shows an inelastic relationship with economic development, their impacts are insignificant. Furthermore, secondary school enrolment suggests a positive but insignificant relationship with standard of living. The evidence from government education expenditure suggests no significant contribution to living standard while health expenditure indicates a significant positive effect on the economy. Further analysis of health expenditure shows that the degree of responsiveness of economic development to changes in public health expenditure is elastic. Therefore, a percentage change in public health expenditure results in higher percentage change in living standards. Specifically, the analysis of the estimated long run reveals that a percentage change in health expenditure results to approximately 131 percentage change in economic development.

4.3 Diagnostic Test Results

Series of diagnostic tests were conducted to address the issue related to the goodness of fit of the ARDL error correction model. These tests examine heteroscedasticity, normality, omitted variables (Ramsey RESET test). The results in Table 4.6 show no challenges of heteroscedasticity, model misspecification or normality.

Table 4.6: Diagnostic Tests Results

Test	F-statistic	P-value	Chi(X^2)statistic	P-value
Heteroscedasticity Test: ARCH	0.795210	0.3799	0.827365	0.3630
Jarque-Bera: Normality			0.476292	0.788088
Ramsey-RESET (log likelihood ratio): Omitted Variable	1.892189	0.1990	0.230311	0.6313

Source; Author's Computation

Table 4.6 reveals that the estimated human capital development model shows evidence of homoscedasticity (constant error variance), symmetric in the distribution of its error terms (Jarque-Bera normality test) and correctly specified with no issue of omitted variables. This implies that the goodness of fit of the model is fulfilled and the results from our analyses are robust and reliable for making inferences and drawing optimal policy decisions. Further evidence from the correlogram of residuals and correlogram of residuals squared confirm absence of serial autocorrelation between the error terms and the parameter estimates of the model (see Tables 4.7 and 4.8).

Table 4.7: Correlogram of Residuals

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. | . |	. | . |	1	-0.060	-0.060	0.1258	0.723
.**| . |	.**| . |	2	-0.298	-0.303	3.3498	0.187
. *| . |	. *| . |	3	-0.069	-0.122	3.5267	0.317
.**| . |	***| . |	4	-0.211	-0.358	5.2607	0.262
. |**. |	. |* . |	5	0.246	0.146	7.7050	0.173
. *| . |	***| . |	6	-0.107	-0.346	8.1829	0.225
. | . |	. |* . |	7	0.037	0.164	8.2440	0.312
. |* . |	. | . |	8	0.188	-0.043	9.8441	0.276
.**| . |	. *| . |	9	-0.313	-0.187	14.478	0.106
. | . |	. *| . |	10	0.017	-0.081	14.492	0.152
. |* . |	. | . |	11	0.087	0.030	14.880	0.188
. | . |	. | . |	12	0.048	-0.007	15.006	0.241
. |* . |	. | . |	13	0.081	-0.051	15.385	0.284
.**| . |	.**| . |	14	-0.335	-0.262	22.167	0.075
. |* . |	. | . |	15	0.082	0.022	22.594	0.093
. |* . |	. *| . |	16	0.130	-0.131	23.745	0.095

*Probabilities may not be valid for this equation specification.
Source; Author's Computation, 2019

Table 4.8: Correlogram of Residuals Squared
Date: 11/22/18 Time: 16:32
Sample: 1981 2015
Included observations: 32

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. *| . |	. *| . |	1	-0.152	-0.152	0.8060	0.369
. | . |	. | . |	2	-0.011	-0.035	0.8106	0.667
. | . |	. | . |	3	-0.038	-0.046	0.8640	0.834
. |* . |	. | . |	4	0.081	0.070	1.1207	0.891
. | . |	. |* . |	5	0.057	0.081	1.2529	0.940
. *| . |	. *| . |	6	-0.120	-0.100	1.8581	0.932
. *| . |	. *| . |	7	-0.092	-0.123	2.2265	0.946
. *| . |	.**| . |	8	-0.177	-0.231	3.6400	0.888
. |* . |	. | . |	9	0.141	0.057	4.5853	0.869
. *| . |	. | . |	10	-0.067	-0.035	4.8093	0.904
. *| . |	. *| . |	11	-0.151	-0.155	5.9869	0.874
. | . |	. | . |	12	0.060	0.047	6.1852	0.906
. | . |	. | . |	13	0.039	0.027	6.2721	0.936
. |* . |	. |* . |	14	0.194	0.159	8.5484	0.859
. *| . |	. *| . |	15	-0.177	-0.130	10.551	0.784
. |* . |	. |* . |	16	0.129	0.081	11.687	0.765

*Probabilities may not be valid for this equation specification.

Source; Author's Computation.

5. CONCLUSION AND POLICY IMPLICATIONS

The study critically analyzed the relationship between human capital variables and economic development proxied by real GDP per capita in Nigeria. The theoretical framework adopted is hinged on the endogenous growth model which underscores the critical role of government policies in the development of quality human capital. The theory posits that human capital development plays a critical role in economic progress through the reduction in inequality, unemployment, poverty, an improved standard of living and enhanced economic growth.

Autoregressive distributed lag technique through the bounds testing approach was employed to examine both the short run and long run relationships of the measures of human capital formation with economic development in Nigeria. The motive is to examine how human capital development has impacted the economy (both in the short run and long run) during the study period. Contrary to a priori, the short run analysis indicated that both primary and secondary enrolments show no positive impact on living standards. This may be attributed to high drop-out rates, as well as inadequate and low quality of education received at these levels of education. Apparently, the outcome of the study implies that low skills are acquired at both the primary and secondary levels of education in Nigeria.

In contrast to expectations, evidently only lag 2 tertiary enrolments significantly and positively impact economic development. Furthermore, government expenditure on education reveals a negative impact on economic development in Nigeria in the short run. This may be due to low efficiency and ineffectiveness in the allocation of government funds, which may be linked to misappropriation and corruption that have long plagued the country. However, government expenditure on health is not only significant but also positively related to economic development in Nigeria.

The long run estimates show that indicators of human capital development such as primary, secondary, tertiary enrolments and government education expenditure are statistically insignificant in explaining economic development while capital formation and government health expenditure significantly influence real GDP per capita. Also, primary, tertiary enrolments and government education expenditure showed a negative relationship with economic development in the long run. Capital formation, secondary enrolment and government health expenditure on the other hand are positively related to real GDP per capita which indicated an improvement in the standard of living during the study period. The outcome in the long run largely contradicts that of Lawanson (2009) but to some extent, consistent with the outcomes of Pritchett (2001) and Dauda (2010).

Further evidence shows that equilibrium is fully restored for any distortion in the short run. Specifically, the error correction term coefficient that explains the speed of adjustment from any distortion in the short run to its long run equilibrium shows that approximately 60.8 per cent of any disequilibrium witnessed in the short run is restored in the first year. Following from the findings, the study recommends the need to adopt policy measures that will ensure efficient, quality and effective allocation of public funds earmarked for the education and health sectors, considering their strategic roles in economic development. Such funds should be logically monitored till the end to prevent its diversion, misappropriation and also, to curb the intended and/or unintended corruptive tendencies of the custodians of the funds. Hence, the imperative of effectiveness, efficiency and quality in governance at all levels in Nigeria cannot be overstressed. Similarly, efforts should be made to provide qualitative and adequate education that will deliver on skills acquisition rather than mere paper qualifications and certificate celebrations that have over the years characterized the system of education in Nigeria, with a view to enhancing job creation thereby reducing unemployment, inequality and poverty for the attainment of economic development. Subject to the availability of consistent, reliable, adequate and non-fragmented data, the need to compare the outcome of the study with using measures of education attainment viz: mean year of schooling, completion/graduation rate, etc. is essential. This can be taken up in subsequent research.

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