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HUMAN CAPITAL DEVELOPMENT AND ECONOMIC GROWTH IN NIGERIA: AN AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) APPROACH

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ABSTRACT

This study investigated the relationship between human capital development and economic growth in Nigeria for the period of 1981-2017. Annual time series data from various issues of the Central Bank of Nigeria (CBN) statistical bulletin and World Development Indicator (WDI) were collected for the dependent variable - gross domestic product per capita (the proxy for economic growth) and the independent variables - human development index (HDI), number of under-five deaths (NUFD), gross fixed capital formation (GFCF), labour force participation (LABF), remittance (REM) and inflation rate (INF). The Augmented Dickey Fuller (ADF) and Dickey Fuller Generalized Least Squares (DF-GLS) detrending test were used to test for unit root while the Auto-Regressive Distributed Lag (ARDL) or the bound testing approach was employed in the study. The result showed that human capital development (HDI), labour force participation (LABF) and remittance (REM) had direct and significant long run impact on economic growth while the short-run estimated model revealed that the one-lagged value of gross domestic product (RGDP) and HDI had direct and significant impact on the dependent variable. The error correction term showed that in event of a disequilibrium, shock or perturbation, the system would restore itself to equilibrium at an adjustment speed of approximately 97.1%. To increase Nigeria's human development index (HDI), it was recommended that remittances from international agencies should not only used judiciously by the government for the development of human capital. This would not only increase creativity, skill and productive capacities but also promote economic growth in Nigeria.

Contribution/Originality: This study is one of the few studies in Nigeria that have investigated human capital-growth relationship with focus on international integration among several others indicators of human capital development in Nigeria. The paper's primary contribution is finding that remittance inflow is one of the international integration components that promotes growth.

1. INTRODUCTION

Human capital is of great importance in any field of endeavour; be it business, ministry, industry or a commission. It is one of the factors of production that is crucial in the development in any given society. Human capital refers to the acquired and useful abilities of all the inhabitants or members of the society.it has been recognized globally as one major factor that is responsible for the 'wealth of nation' (Oladeji, 2015). The definition of a nation's wealth has widened to accommodate not only physical capital but also human capital as an independent

factor of production required to achieve high and sustainable economic growth. In recognition of this relationship, developing nations have in varying degrees, attempted to stimulate the accumulation of human capital through public education expenditure as well as government spending on health and related social services (Adebiyi, 2006).

Human capital development is commonly measured using a composite index called the human development index (HDI). This index constitute health, knowledge, and standard living components using life expectancy at birth, expected years of schooling and quality of life as proxy respectively. Aside the HDI, there are other human development composite indices like the inequality-adjusted human development index, gender inequality index and multi-dimensional poverty index (Kairo., Mang, Okeke, & Aondo, 2017). On the other hand, there are other important human development indicators which are not fully integrated in the human development index.

As succinctly identified by the United Nations Development Programme (2016) nine (9) of these indicators and their sub-variables include: a) population trend indicators – such as total/average annual population growth, urban population, young and old age dependency ratio and birth per woman; b) health outcome indicators – such as infants exclusively breastfed, physicians per 10,000 people; c) education achievement indicators such as population with at least some secondary education, gross enrollment ratio into preprimary, primary, secondary, tertiary and other education quality measures; d) national income and composition of resources indicators- general government final consumption expenditure as percentage of GDP, gross capital and gross fixed capital formation and domestic food price level; e) work and employment indicators – such as employment in agriculture and services, labour force participation, vulnerable employment; f) human security indicators such as refugee by country of origin, internally displaced persons, depth of food deficit (kilocalorie per person perday); g) international integration indicators such as net official development assistance, remittance inflows, number of internet users and mobile phone subscription; h) Supplementary or perception of well-being indicators) such as perception of individuals on their well-being, confidence in the judicial system, trust in national government; and i) status of fundamental human right treaties covers a nations membership, year of ratification and commitment to international human right treaties such as: CAT (Convention Against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment) among others (United Nations Development Programme, 2016).

The United Nations Development Programme (2016) submitted that the aforementioned indicators directly or indirectly measure a nation's development of human capital using the output, cost or income-based approaches. This explains that health and education among others are two closely related human capital components that work together to make the citizens more productive. Taking one component as more important than the other is unrealistic as a more educated individual, who is ill, is as inefficient as an illiterate, but healthy individual (Kairo. et al., 2017) asserted that health and education are components of human capital that are contributors to human welfare. He added that these components are different from other types of goods produced in societies because the production of other durable and consumer goods only depend on the health quality and skills, education or training of labour in the society. This is the reason health services are often subsidized by the state while education is made compulsory for certain minimum length of time. Moreso, in some developing countries, new educational policies are often implemented to meet the needs and aspirations of citizens.

Meeting the commendable United Nation's Sustainable Development Goals (SDGs) of a reduction by two-thirds in the under-5 mortality ratio and a reduction by three-quarters in maternal mortality, and halting and beginning to reverse the spread of HIV/AIDS, malaria and other major diseases will be completely elusive for Nigeria if sufficient attention is not paid to health expenditures (Obialor, 2017). Similarly achieving Universal Primary Education (UPE) and eradicating child and adult illiteracy which are core objectives of the (MDGs) could be a mirage if adequate attention is not given to the education sector by the federal government. Recently, the United Nations Development Programmes (UNDP) in its 2016 report placed Nigeria in the 152nd positions in the low, Human Development category (United Nations Development Programme, 2016). By the UNDP ranking, Nigeria could not even come or appear in the medium Human Development category in which some developing

countries such as Ghana, Morocco, Sao'tome and Congo among others featured. Therefore the hypothesis formulated and tested in this study is:

- *Ho: Human capital development (educational achievement, health outcome, national income composition, and work-employment and international integration) has no significant impact on real gross domestic product in Nigeria.*

2. THEORETICAL/EMPIRICAL LITERATURE

The theoretical framework of this study was based on the endogenous growth model where persistent economic growth is conditioned on human capital accumulation (Lucas, 1988; Romer, 1990; Romer., 1994). The proponents of endogenous growth models opined that growth rate of output is endogenously determined within the economic environment. The implication of these models is that human capital is the driving force in the growth process of an economy. The theoretical consideration which this study is anchored on stems from the generalization of the human capital production technology as determinants of growth and the accessible channels of human capital investment in developing countries in which associated consensus is still controversial in literature.

Several studies, both in Nigeria and abroad, have been carried out to examine the relevance or importance of human capital development in the achievement of economic growth. Ogunniyi (2018) explored the relative impact of human capital formation on economic growth in Nigeria from 1981 to 2014 using time series data of thirty four (34) years. The empirical analysis began with an investigation of the stationarity of the variables specified under the model specification upon which the study used the auto regressive descriptive lag (ARDL) bound estimation techniques to examine the existence of long run and short run dynamic relationship between human capital formation and economic growth in Nigeria. The results showed that a long run dynamic relationship exists between human capital formation (educational and health policy development) and economic growth in Nigeria. Ali, Egbetokun, and Memon (2018) investigated that Human capital, social capabilities and economic growth in Nigeria the sample comprised 132 countries from 1996 to 2011. The Fixed Effects (FE) models, Random Effects (RE) models and Generalized Method of Moments (GMM) were used in the study. The empirical results revealed that human capital plays a positive role in per capita GDP growth only in the presence of better economic opportunities and high-quality legal institutions.

Oisaozoje and Opusunju (2016) examined the impact of human capital development on economic growth in Nigeria. Time series data were collected from secondary source from 1999-2015. The Ordinary Least Squaress (OLS) was adopted and finding reveals that human capital development and economic growth in Nigeria is insignificant. Adekola (2014) contributed to existing literature by examining data on Nigeria between 1961 and 2012 to conduct a regime shift analysis of the empirical relationship subsisting between public investment in human capital and economic growth. Augmented Dickey Fuller test, Johansen's Cointegration technique and Parsimonious Error Correction procedure were used. Empirical findings established the fact that federal and states governments' spending on human capital (education and health) impacted positively on economic growth in Nigeria individually and collectively.

Jaiyeoba (2015) carried out an empirical investigation on the relationship between investment in education, health and economic growth in Nigeria, using time series data from 1982 to 2011. This study employs trend analysis, the Johansen co-integration and Ordinary Least Squares (OLS) technique. Empirical findings however indicated that there is a long-run relationship between government expenditure on education, health and economic growth. The variables: health and education expenditure, secondary and tertiary enrolment rate and gross fixed capital formation appear with the expected positive signs and are statistically significant (except government expenditure on education and primary enrolment rate).

Adeyemi and Ogunsola (2016) examined the impact of human capital development on economic growth in Nigeria using time series data spanning from 1980 to 2013. The study employed Auto Regressive Distributed Lagged (ARDL) Co-integration analysis to estimate the relationship among the variables used in the study. The

study established long-run co-integration among the variables. The findings from the study revealed that there is positive long-run relationship among secondary school enrolment, public expenditure on education, life expectancy rate, gross capital formation and economic growth but it is statistically insignificant. The results also showed that there is negative long-run relationship among primary, tertiary school enrolment, public expenditure on health and economic growth.

Obialor (2017) examined the effect of government human capital investment on the economic growth of three Sub-Sahara African (SSA) countries of Nigeria, South Africa and Ghana from 1980 to 2013. Secondary data are sourced from World Development Indicators (WDI) online Database and analyzed using Co-integration techniques and Vector Error Correction mechanism (VECM) at 1% and 5% significance levels. The results indicated that two out of the three human capital proxy variables: Health (GIH) and Education (GIE) showed significant positive effect on growth only in Nigeria, while literacy ratio (LR) is insignificantly positive in all countries.

Kairo. et al. (2017) empirically studied the relationship between human capital development and government expenditure. Data were collected over the period 1990-2014. Augmented Regressive Distributed Lag (ARDL) and impulse response function were adopted for the estimation. The Bound Test was used to determine that a long run relationship exists between Human Development Index (HDI) and government expenditure (GOVEXP). The results demonstrated that both in the long and short run, government spending has remained positive but to a very large extent insignificant to human capital development in Nigeria. Amassoma and Ikechukwu (2016) studied the causal nexus between human capital investment and economic growth in Nigeria for sustainable development in Africa at large between 1970 and 2009 using a Vector Error Correction (VEC) and Pairwise granger causality methodologies. The findings of the Vector Auto-Regressive (VAR) model and pairwise estimate reveal no causality between human capital development and economic growth.

In appraising the review of literature, the foregoing shows that most of the recent studies on human capital development and economic growth in Nigeria only relied on government expenditure on education and school enrollment; government expenditure on health and life expectancy; labour force participation and youth unemployment as measures to capture education achievement, health and work-employment indicators of human capital development respectively while other essential indicators of human capital such as population trend indicators, human security, international integration indicators and perception of wellbeing are uncommon in empirical investigations. Consequently, a knowledge gap exists on this in literature. In spite of what is known on human capital development and economic growth in Nigeria, it is not to the researcher's knowledge that any study has recently been carried out to investigate the relationship between human capital development and economic growth in Nigeria with focus on other significant components of human capital like international integration of citizens of a nation. This gap is what this study sought to fill.

3. RESEARCH METHODS

The *expost* facto design was employed to explore the impact of the explanatory variables on the outcome variable. The study employed annual time series data spanning the period 1981 to 2017. The variables of the study which include: real gross domestic product (RGDP) at constant price, gross fixed capital formation (GFCF) and inflation rate (INF) were obtained from various issues of the Central Bank of Nigeria (CBN) Statistical Bulletin while the human development index (HDI), number of under-five deaths (NUFD), labour force participation (LABF) and remittance (REM) were obtained from various issues of the World Development Indicators (WDI).

The unit root tests which include Augmented Dickey Fuller (ADF) and Dickey Fuller generalized Least Squares (DF-GLS) detrending unit-root test were used to test the stationary property of series while the equation was estimated using the Auto-Regressive Distributed Lag (ARDL) to cointegration approach developed by Pesaran and Shin (1999) and latter extended in 2001. The econometric views package (E-views version 7) was used to analyse the data. The method of the study was briefly discussed under three major sub-headings namely: a) Unit

root test; b) ARDL or Bound testing approach; and c) Pairwise Granger Causality Test. In the study on human capital development and economic growth in Nigeria, Ditimi and Ephraim (2016) specified their equation as follows:

$$LogPERCAPITA = \alpha_0 + \alpha_1 LogHUMANCAP + \alpha_2 LogPUBLIC + \alpha_3 LogGFCF + \alpha_4 LogINF + \alpha_5 LogEXCHR + \alpha_6 LogLABFORCE \quad [1]$$

From Equation 1, PERCAPITA is gross domestic product per capita in natural logarithm, HUMANCAP is human development index, PUBLIC is government total expenditure on expenditure and health, GFCF is gross fixed capital formation, INF is inflation rate, EXCHR is exchange rate while LABFORCE is labour force. The variables in the right hand side of Equation 1 represent the human capital development indicators. Therefore, Equation 1 formed the empirical model used by Ditimi and Ephraim (2016). This model will be adapted by replacing replacing some variables thus: First, government total expenditure on expenditure and health (PUBLIC) in Equation 1 will be replaced with Government Final Consumption Expenditure (GFCE) to capture national income composition. Second, remittance inflow (REM) will replace exchange rate to capture international integration in human development. Lastly, PERCAPITA which is gross domestic product per capita in natural logarithm will be replaced with real gross domestic product. Measuring real gross domestic product per capita using some approaches (particularly purchasing power parity) may be a good measure of economic welfare, national income distribution and standard of living in a given nation (Howitt, 2005; Jhingan, 2005; Kuznets, 1971). Hence, to avoid poor estimation and possible collinearity between the ratio of real gross domestic product (RGDP) to population and total labour force participation, PERCAPITA was replaced with RGDP to proxy economic growth. The modified Equation 1 is specified functionally as follows:

$$RGDP = f(HDI, NUFD, GFCE, LABF, REM, INF) \quad [2]$$

Adopting a log-linear specification, taking the natural logarithm of both sides of the equation and assuming linearity among the variables gives:

$$LnRGDP = \alpha_0 + \alpha_1 HDI_t + \alpha_2 LnNUFD_t + \alpha_3 LnGFCE_t + \alpha_4 LnLABF_t + \alpha_5 LnREM_t + \alpha_6 INF_t + U_t \quad [3]$$

$$\alpha_1 > 0, \quad \alpha_2 < 0, \quad \alpha_3 > 0, \quad \alpha_4 > 0 \quad \alpha_5 > 0 \quad \alpha_6 < 0$$

Where:

RGDP is the Real Gross domestic product at constant price (₦billion), HDI represents Human development index, NUFD denotes Number of under-five deaths, GFCE is the Government Final Consumption Expenditure on human infrastructure (₦billion), LABF is Labour Force Participation (total number of working age population that are actively engaged in work) , REM is Remittance inflow from human developmental assistance (₦million), INF is Inflation rate (%), *Ln* is Natural logarithm, α_0 is the Constant of the model, α_1 -α_6 are all slopes of the estimates, U is the disturbance term while t is the time (yearly trend).

4. RESULTS

The result of the unit root test is presented below:

Table-1. Unit Root test result on the Variables.

Series	ADF statistics	Critical values		Order of Integration	DF-GLS statistics	Critical values		Order of Integration
		1%	5%			1%	5%	
LNRGDP	-4.412	-3.633	-2.948	*I*(1)	-4.087	-2.633	-1.951	*I*(1)
HDI	-5.586	-3.633	-2.948	*I*(1)	-5.337	-2.633	-1.951	*I*(1)
LNNUFD	-5.187	-3.633	-2.948	*I*(0)	-3.312	-2.633	-1.951	*I*(0)
LNGFCE	-3.672	-3.633	-2.948	*I*(1)	-6.280	-2.633	-1.951	*I*(1)
LNLABF	-3.833	-3.633	-2.948	*I*(1)	-2.699	-2.633	-1.951	*I*(0)
LNREM	-14.885	-3.633	-2.948	*I*(1)	-7.477	-2.633	-1.951	*I*(1)
INF	-5.501	-3.633	-2.948	*I*(1)	-3.236	-2.631	-1.951	*I*(0)

Results from Table 1 showed that the ADF statistics indicated that only LNNUFD was stationary or integrated at level i.e $I(0)$ while LNRGDP, HDI, LNGFCE, LNLABF, LNREM and INF were stationary or integrated in their first differencing i.e $I(1)$. For the DF-GLS detrending statistic, results indicated that LNNUFD, LNLABF and INF were stationary at level or integrated at order zero i.e $I(0)$ while LNRGDP, HDI, LNGFCE and LNREM were stationary at first differencing i.e integrated at order one $I(1)$. Following the DF-GLS statistics, this implies that the hypothesis of non-stationarity was retained for LNNUFD, LNLABF and INF but rejected for LNRGDP, HDI, LNGFCE and LNREM. The stationarity of the series at level and first differencing; justified that we can confidently apply the ARDL framework to our model. The ARDL bounds test for the presence of long-run relationships are reported in Table 2.

Table-2. Bounds Test Results for Cointegration Relationship.

Critical Bounds Value of the *F*-statistic					
1% level		**5% level**		**10% level**	
$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
3.267	4.540	2.476	3.646	2.141	3.250
Calculated *F*-statistic ($\mathbf{F_c}$) = ***5.543***					

Note: K is the number of regressors. Critical Bounds values of the F-statistic are obtained from the Pesaran., Shin, and Smith (2001) Case II: Unrestricted intercept and no trend.

The bounds *F*-test for cointegration test in Table 2 yielded evidence of a long-run relationship between economic growth and human capital development indicators. The computed *F*-statistic (F_c) of 5.543 is greater than the lower and upper critical bound limits at 1%, 5% and 10% critical values resulting in the rejection of the null hypothesis which stated that no long-run relationship exist between the examined variables. The estimated long run impacts of the regressors using a lag length of one on the ARDL model are shown in Table 3. The optimum lag 1 selected is based on the LP, FPE, AIC, SC, and HQ lag criteria.

Table-3. Estimated Long-run ARDL Model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.3394	2.1948	2.4328	0.0216
LNRGDP(-1)	0.0852	0.1952	0.4363	0.6660
HDI(-1)	0.3271	0.1304	2.5083*	0.0219
LNNUFD(-1)	-0.1268	0.2708	-0.4684	0.6431
LNGFCE(-1)	0.0584	0.0333	1.7521	0.0907
LNLABF(-1)	0.6973	0.2014	3.4631*	0.0017
LNREM(-1)	0.0117	0.0107	1.0904	0.2848
INF(-1)	0.0276	0.0118	2.3317*	0.0349
R-squared	0.558	F-statistic		3.379
Adjusted R-squared	0.422	Prob(F-statistic)		0.009
		Durbin-Watson stat		1.797

Note: Dependent Variable: LNRGDP * Coefficient is significant at 5 percent level ($p<0.05$).

Table 3 shows the estimated long-run relationship between economic growth and human capital development indicators. The estimated long-run model revealed that a one year lag value of real gross domestic product at constant price (LNRGDP), government final consumption expenditure (LNGFCE) and remittance (LNREM) had direct but insignificant effect on economic growth while the impact of number of under-five death (LNNUFD) was inverse and statistically insignificant. On the other hand, human capital development (HDI), labour force participation (LNLABF) and inflation rate (INF) had direct and significant impact on economic growth. This outcome is quite consistent with apriori expectation.

The result showed that a 1% increase in human capital development (HDI) would bring about 32.7% increases in economic growth (LNRGDP). This outcome does not confirm the work of Oisaozoje and Opusunju (2016) who found that the relationship between human capital development and economic growth in Nigeria was insignificant. The result also agrees with the work of Jaiyeoba (2015) that health and education expenditure, secondary and

tertiary enrolment rate and gross fixed capital formation all significantly contributed to economic growth. Given that human capital development is a composite index that measures health, education and standard of living of citizens, Jaiyeoba submitted that education and health policies remains an important driver of national income in Nigeria. Furthermore, the result of the researcher is quite consistent with the work (Oisaozoje & Opusunju, 2016) that human capital development has direct impact on economic growth. The author (Oisaozoje & Opusunju, 2016) concluded that human capital development through educational development, government expenditure on education and health had significant relationship with economic growth.

Number of infant deaths (LNNUFD) is one of the variables that measure the head count of infant deaths (children below five years) per year. It is an indicator of health quality of citizens in a given nation such that an increase in the number of infant deaths is considered to be due to low access to quality medication and poor health facility provision in the nation. Although the relationship between number of infant deaths and economic growth was insignificant, the relationship between the variables was inversely related; indicating that a 1% decrease in the number of infant deaths would bring about an approximate increase in economic growth (LNRGDP) by 12.7% in the long run. This inverse relationship agrees with the appriori expectation and corroborates the work of Adeyemi and Ogunsola (2016) who previously found that there is an inverse long-run relationship between health and economic growth. Similarly, Obialor (2017) found that health is an important component of HDI that contributes to economic growth in Nigeria. On another hand, the result is consistent with that of Kairo. et al. (2017) who found that governments spending on health had significant direct impact on economic growth through human capital development.

Labour force participation and government final consumption expenditure are indicators of human capital development (HCD). The former measures the development of work-employment quality among the working age population of a nation while the latter (government final consumption expenditure) is an HCD indicator that captures national income composition and measures contribution of the national government to social welfare of citizens through expenditure on final consumption goods and services. The result of the researcher showed that labour force participation had a significant direct relationship with economic growth in the long run while the impact of government final consumption expenditure on economic growth was only significant in the short run. This result disagrees with the result of Amassoma and Ikechukwu (2016) who found that labour force exhibited a significant but inverse relationship with the level of GDP per capita in Nigeria. However, the result of the study agrees with Amassoma and Ikechukwu's study that public expenditure had direct and significant relationship with investment in human capital development and growth. This implies that the amount of government expenditure on human capital development in promoting easily access of citizens to qualitative education; has the tendency to promote economic growth in Nigeria.

The R-squared (R^2) of 0.558 indicates that the model explained about 55.8% variations in the dependent variable. The adjusted coefficient of determination (R^{-2}) of 0.422 measures the reduced explanatory power of the model. It further explains that the independent variables are able to explain 42.2% of any systematic change in GDP per capita while the unexplained residue of 57.8% is attributed to values in the error term or other randomized variables not captured in the model that have prominent impact on the dependent variable (economic growth). The F-statistic of 3.379 is jointly statistically significant ($p<0.05$). Therefore, the overall parameter estimates for the model are jointly statistically significant. The Durbin Watson (D.W) statistic is approximately equal to 2. This explains that there is no presence of serial auto-correlation between or among the independent variables following the rule of thumb ($1.8 \geq DW \leq 2.2$).

Short-run estimate of the equation using the ARDL model framework is shown in Table 4. Following the LP, FPE, AIC, SC, and HQ lag length selection criteria; an optimum lag length of one was employed for estimation of the short run equation on the ARDL model See Table 4.

Table-4. Estimated Short-Run ARDL Model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0134	0.0417	0.3207	0.7510
D(LNRGDP(-1))	0.9704	0.2911	3.3333*	0.0026
D(HDI(-1))	0.1779	0.1933	0.9204	0.3658
D(LNNUFD(-1))	-0.5113	0.6560	-0.7794	0.4428
D(LNGFCE(-1))	0.0810	0.0364	2.2216*	0.0352
D(LNLABF(-1))	0.5728	3.7513	0.1527	0.8798
D(LNREM(-1))	0.0150	0.0068	2.1998*	0.0363
D(INF(-1))	-0.0277	0.0130	-2.1339*	0.0425
ECM(-1)	-0.9547	0.3154	-3.0274*	0.0055
R-squared	0.616	Mean dependent var		0.006
Adjusted R-squared	0.567	S.D. dependent var		0.028
F-statistic	3.466	Durbin-Watson stat		1.881
Prob(F-statistic)	0.007			
Breusch-Godfrey Serial Correlation LM Test				
F-statistic = 0.979		Prob. F(1,17) = 0.335		
Obs*R-squared = 1.405		Prob. Chi-Square(1) = 0.190		
Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic = 1.544		Prob. F(14,20) = 0.182		
Obs*R-squared = 18.184		Prob. Chi-Square(14) = 0199		
Scaled explained SS = 7.677		Prob. Chi-Square(14) = 0.906		
Ramsey (RESET) test of model specification fitness				
F-statistic = 1.5546		Prob. F(6,22) = 0.09412		
Likelihood ratio = 3.2005		Prob. Likelihood ratio(6) = 0.2346		
Jarque-Bera test of Normality				
Jarque-Bera 4.267		**Prob = 0.1184**		

Note: Dependent Variable: D(LNRGDP) *Coefficient is significant at 0.05 level (p<0.05).

The short-run estimates of human capital development on economic growth in Nigeria within 1981 to 2017 are presented in Table 4. The short-run estimates were iterated at same lag lengths and the optimal lag of one was determined using the Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ). The error correction term (ECM) that explains the speed of adjustment from any distortion in the short-run to its longrun equilibrium is correctly signed and statistically significant at 0.05 level of significance (p<0.05). The magnitude of the error correction term (-0.955) shows that if there is disequilibrium, the system will restore itself to equilibrium with a speed of adjustment of approximately 95.5%.

Table 4 displays the estimated short-run relationship between economic growth and human capital development indicators. The short-run estimated model revealed that the one-period lagged values of LNRGDP, LNGFCE and LNREM all had direct and significant impact on the dependent variable. The impact of one-lagged value of LNNUFD was indirect and insignificant. The one-period lagged value of the LNNUFD had inverse and insignificant impact on economic growth while the one-lagged value of INF had inverse and significant impact on economic growth in the short-run. Lastly, the one-lagged values of HDI and LNLABF had direct and insignificant impact on the dependent variable.

The result showed that a one period lagged value of government spending and remittance inflows had significant direct impact on current year's growth in the short-run. The result corroborates the study of Adekola (2014) who found that one period lagged value of federal and state government's spending and international integration efforts (such as remittance inflows, donations and developmental assistance from nationals in diaspora and international agencies) promotes human capital development for economic growth in Nigeria.

The r-squared (R^2) of 0.616 and the adjusted coefficient of determination (R^{-2}) of 0.567 indicates that the model explained about 61.6% and 56.7% variations in the dependent variable respectively. The F-statistic of 3.466 is significant at 5% and indicates that estimated coefficients are jointly significant. The Durbin Watson (D.W) statistic of 1.881 is approximately equal to 2. This explains that there is no presence of serial auto-correlation between or

among the independent variables following the rule of thumb ($1.8 \geq DW \leq 2.2$). The diagnostic test result indicated that the residual generated from the long-run estimates used as error correction term (ECT) in the short-run model estimates and presented in Table 4 is normally distributed, not serially correlated and the variance of the error term are homoskedastic. Breusch-Godfrey Serial Correlation LM Test was used to check hypothesis about the fact that no serial correlation exist between the short run and long run period. The test has the null hypothesis of no serial correlation; hence, its rejection requires that the probability value exceeds appropriate threshold or level of significance at which the test is carried out e.g 0.05 (or 5%). Since the F-statistic of the Breusch-Godfrey Serial Correlation LM Test (0.979) is not statistically significant ($p>0.05$); hence, the null hypotheses is retained.

The Breusch Pagan statistic tests for homoscedasticity with the null hypothesis that homoscedasticity exist. Since the test statistic (F-statistic of the Breusch-Pagan-Godfrey = 1.544) has a p-value greater than the appropriate threshold ($p>0.05$), the null hypothesis of homoscedasticity is thereby retained. In addition to this, the coefficients of Ramsey RESET (regression equation specification error test) and Jarque-Bera were not statistically significant ($p>0.05$). Hence, we cannot reject the null hypotheses of none existence of model error specification and normality of residual distribution respectively. This indicates that the model is well specified and the residuals are normally distributed.

5. CONCLUSION

The quality of any nation can be described in relation to the quality of its human capital. Based on findings, it is concluded that number of infant deaths had inverse relationship with real gross domestic product (RGDP) while human capital development (HDI), labour force participation (LABF) and remittance (REM) had direct and significant long-run impact on economic growth in Nigeria. This clearly indicates that all efforts by the government and international community that is geared towards reducing infant mortality by increasing the number of physicians, mid-wives, and surgeons per thousand population would not only bring improve the quality of health service provided to citizens but further increase the quality of labor force for productive activities.

Furthermore, the direct impact of human capital development, labour force participation and remittance clearly indicates that well-educated, healthy and skilled labour force are major drivers of economic growth in the country. This growth is further boosted by the efforts of the Nigerian government towards international integration. Such efforts culminate in the judicious use of remittances from international agencies and international integration of citizens with the rest of the world through increased mobile telecommunication and internet access. Hence, it is concluded that education achievement, health outcome and international integration are all important human development indicators that boosted economic growth in Nigeria.

6. RECOMMENDATIONS

The following recommendations were made for policy implementation:

1. To increase Nigeria's human development index (HDI), the federal government of Nigeria should endeavour to allocate twenty six percent (26%) of the nation's gross domestic product (GDP) to development of the education sector in adherence to the recommended of the United Nations Educational Scientific and Cultural Organization (UNESCO).
2. Aside education and health, the Human capital development as a composite index also incorporates some standard of living measures such as quality of diet, housing and access to basic necessities. In this light, the State government needs to establish a food security policy that would promote land-use for agriculture, reduce price of food crops and promote health security of citizens of productive age. Housing policy aimed at reducing the cost of building materials and access to affordable housing facilities should be provided along with basic social amenities like electricity, good road network and portable water.

3. Remittances from international agencies should not only used judiciously by the government for the development of human capital. This would not only increase creativity, skill and productive capacities but also promote economic growth in Nigeria.

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