

# DRIVERS OF HUMAN CAPITAL DEVELOPMENT: EVIDENCE FROM NIGERIA

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*Human capital is globally recognized as an engine and foundation for long term economic growth and this explains why governments across the globe (Nigeria including) make concerted efforts towards achieving meaningful human capital development. Despite massive expenditures on health and education, Nigeria still grades amongst the poorest and most miserable in the world in terms of human development index. Our study investigates the determinants of human capital development in Nigeria over the period 1985 to 2017. Hinged on the human capital theory as well as Sen's capabilities approach, we developed a human capital model and employed the techniques of cointegration within the framework of the autoregressive distributed lag model on Nigeria's time series. Our findings show that whereas expenditures on health and education, growth in per capita income, and employment rate are significant drivers of human capital development in Nigeria, inflationary tendencies (captured by the consumer price index) significantly deters human capital development. Furthermore, infrastructural development positively impacts on human capital development but these impacts do not significantly drive human capital development in Nigeria. In addition to recommending government policies towards inflation control, we advocate for government prioritization of infrastructural development to boost the economic and social welfare of Nigerians as well as the dividends of democracy.*

**Keywords:** Education, Health, Human capital development, Nigeria, Per capita income

**JEL Classification:** J24, O15

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## 1. Introduction

The literature recognizes human capital as an important factor of production and that which determines the extent of economic development. Human capital is the stock of production, knowledge, and skills possessed by workers to increase productivity. It is the key element in improving firms' assets and employees in order to improve productivity as well as sustain a competitive advantage. Coinage of human capital as a concept is traced to the classical school of thought following the argument that labour becomes a tool for a competitive advantage when it goes through adequate processes of training, education, skills and initiatives acquisitions, all geared towards knowledge acquisition. Human capital development is human-centred as its major concern is on human empowerment which connotes active participation. OECD (2001) sees human capital as being concerned with knowledge, skills competitiveness and attributes embedded in an individual that facilitates the creation of personal, social, and economic wellbeing.

The significance and relevance of human capital development in achieving meaningful and sustainable economic growth and development are widely acknowledged in development studies (Barro & Lee, 2000; World Bank, 2010). This explains why the development of human capital has remained central to most development strategies of both advanced and developing countries of the world. In Nigeria, human capital development is highly appreciated as germane for sustainable growth and economic development, hence developing human capital is the centre piece of Nigeria's development plans. Regrettably, Nigeria is ranked amongst the poorest and most miserable in the world in terms of human development index despite its vast human and material resources (World Economic Forum, 2015). This, therefore, raises a fundamental question regarding the factors that drive human capital development in Nigeria.

Early theories of human capital development identified investments in education and training, as well as effective healthcare services, as key factors that drive human capital development (Schultz, 1961; Becker, 1964; Oster, et al 2013). Other fundamental determinants of human capital development as identified in the literature include, employment level which could encourage or discourage one to go into further self-development; a stable macroeconomic environment which facilitates low inflation; peoples' income (in the form of real per capita income) with which they can access the necessities of life such as quality education, healthcare and infrastructure, and institutional framework which is usually measured in terms of democratic governance (Sandstorm, 1994; UNDP, 2000; Bildirici et al, 2005; World Bank, 2010).

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In recognition of the above-determining factors, successive Nigerian governments have adopted various policies and programme aimed at achieving human capital development. Over the years, Nigeria has invested in health and education as well as embarked on several growth policies, while targeting a stable macroeconomic environment. These efforts are exemplified in various development plans such as the National Economic Empowerment and Development Strategy (NEEDS), the Seven-Point Agenda, the VISION 20:2020, and currently, the Economic Growth and Recovery Plan, with the aim of developing and increasing its stocks of human capital which are central to overall economic development (Nwokoye et al., 2019). However, despite these efforts, the rate of human capital development has remained low in Nigeria.

**Table 1: Health Expenditure in Nigeria, 1995-2014**

<b>Year</b>	<b>1995-1999</b>	<b>2000-2004</b>	<b>2005-2009</b>	<b>2010-2014</b>
Public health exp (% of Total)	25.04	29.10	32.62	29.00
Private health exp (% of GDP)	2.32	2.40	2.76	2.61
Public health exp (% of Govt Exp)	8.51	11.30	17.69	16.70
Public health exp (% of GDP)	0.78	0.98	1.33	1.06
Total health exp (% of GDP)	3.10	3.38	4.09	3.66

*Source: World Health Organization Global Health Expenditure database*

Successive Nigerian governments have for the past three decades increased substantially their budgetary allocation to health and education as shown in Table 1. Despite the increase in investment of the health and education sector, the Nigerian economy is still characterized by underdevelopment as is evidenced by the 2018 World Human development indicator presented in Table 2.

**Table 2: HDI Comparison between Nigeria and Selected African Countries**

<b>Income Level</b>	<b>Country</b>	<b>HDI Value</b>	<b>Global Rank</b>
Upper-Middle	Mauritius	0.790	65 <sup>th</sup>
Lower-Middle	Tunisia	0.735	95 <sup>th</sup>
Upper-Middle	Gabon	0.702	110 <sup>th</sup>
Lower Income	Congo	0.060	137 <sup>th</sup>
Lower-Middle	Ghana	0.592	140 <sup>th</sup>
Lower-Middle	Kenya	0.590	142 <sup>nd</sup>
Upper-Middle	Angola	0.581	147 <sup>th</sup>
Lower-Middle	Nigeria	0.532	157 <sup>th</sup>

*Source: United Nations Development Programme Human Development Report, 2018*

Table 2 shows that Nigeria which is the most populous country in the Sub-African region ranked 157<sup>th</sup> out of 187 countries evaluated by the United Nations Development Programme (UNDP) in the 2018 human development report. Indicators of human capital development like health expenditure in Nigeria have shown very poor outcomes. In this view, Schultz (1993) noted that most African countries, including Nigeria, recorded weak health and education indicators compared to other regions around the world. From the foregoing, it is clear that low

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human capital development constitutes the problem that the Nigerian economy has to face. Thus, improving human capital development in Nigeria as an engine of growth and development has become a major concern for researchers and policymakers and this motivates the present study. To this, the UNDP (2018) Report on human development indices placed Nigeria behind Tunisia, Ghana, Kenya, and Congo all of whom are in the same income level with Nigeria.

The rapid economic growth in countries that have high-quality human capital has stimulated a large number of empirical studies on the determinants of human capital. These studies conclude that economic growth, infrastructural development, institutional quality, health and education expenditures are the major determinants of human capital development (Ravallion 1991; Oketch 2005; Simko & Tuicu 2015; Shaibu & Oladayo 2016; Rastogi & Gaikwad 2017; Ubi-Abai & George-Anokwuru 2018; Tsaurai 2018). However, virtually all the available studies are based on cross-country data (Ravallion 1991; Oketch 2005; Shaibu & Oladayo 2016; Rastogi & Gaikwad 2017; Tsaurai 2018). Simko and Tuicu, (2015) are based on Swedish data, while only Ubi-Abai and George-Anokwuru (2018) is based on data from Nigeria. Thus, there are limited studies on the determinants of human capital development in Nigeria. This is part of the motivation of this study. This study therefore investigates the long term drivers of human capital development in Nigeria, especially within the context of health and education expenditures, economic growth, democratic governance, employment rate, general price level, and infrastructural development in order to provide focus areas for policy interventions. Furthermore, unlike previous studies, our data sets are time-series and our study uses the contemporary econometric techniques of cointegration and error correction mechanism within the framework of the Autoregressive Distributed Lag (ARDL) model since it is a time-series methodology that has been proven to be superior to the conventional methods (Johansen and Engle-Granger methods), given that it overcomes the problems associated with a small sample, endogeneity bias, same-order of integration of variables, and the problem of choosing the appropriate lags of the dependent and independent variables (Pesaran, et al. 2001).

The rest of our paper is structured as follows: following this introduction in Section one, Section two deals with the review of extant literature. Section three outlines the method we used for the study, and Section four presents the results and discusses our findings. Section five concludes the study and proffers policy recommendations for policy impacts.

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## 2. Review of Extant Literature

The application of capital on human is not recent. The view that a human and his qualification might be a part of capital has proponents among the classical economists since the dawn of economics. W. Petty, W. Farr, A. Smith, J.B. Say, N. Senior, F. List, J.S. Mill, A. Marshall, V. Thunen, W. Roscher, W. Bagehot, E. Engel, H. Sidgwick, and L. Walras are most prominent of these economists. Subsequently, the theory was improved by Becker (1964), Mincer (1958), Schultz (1961) Harbison and Myers (1965). Whereas the Classical School asserts that skills gained by human are some forms of capital, economists generally accept humans as capital. Capital is man-made aid to production such as buildings, machines and tools hence man is capital when characteristics such as education, training, good healthcare, skills, etc. help to turn man from its crude nature to acquire skills that increase productivity. In other words, man can be regarded as human capital because of investments that have been directed towards him by parents, friends, himself and the society at large.

The human capital theory, as originated by Schultz (1993), centers more on how education, health, training, and skills increase productivity and efficiency of workers by increasing their levels of cognitive, affective and psychoactive skills. In this regard, the theory postulates that human capital is the key element in improving a firm's assets and employees to increase productivity, as well as a sustainable competitive advantage. Human capital engrosses resources that are inherent in human being, which can be developed to improve their respective living conditions.

The human capital model further links expected lifetime employment to one's incentive to acquire marketable training. In turn, trainings acquired formally and on the job, determine earning potentials. Thus expected lifetime work histories, as well as social benefits such as reduced crime, reduced unemployment, and greater economic growth, are most important motivators towards the achievement of high earnings. Ezeaku et al (2008) assert that human capital development is a key determinant of economic progress because it initiates technological advancement as well as invention and innovativeness through the advancement of intellectual capital (available stocks and flows of knowledge), social capital (stocks and flows of knowledge gained from networking), and organizational capital (institutionalized knowledge stored in organizations' databases and manuals).

The literature is fraught with a plethora of empirical studies relating to issues in human capital development and the economy, for both foreign and Nigerian studies. A review of the literature shows that available empirical studies seem to have shown more concern on the economic growth impact of human capital development especially from studies carried out within Nigeria. There is a dearth of empirical studies with adequate information on the factors that drive human capital development in Nigeria. Our focus of review relates to studies that

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are directly relevant to the chosen theme. For instance, Ravallion (1991) investigated the impact of public expenditures towards the provision of social services like infrastructure, education and health facilities on human development in some selected less developed countries. Using the method of descriptive statistics, the results showed that public expenditures related to public provision of social services especially towards education and health facilities had a positive relationship with human development. Oketch (2005) investigated the determinants of human capital formation and economic growth of African countries by identifying the two-way links between human resource development produced by formal schooling and economic growth and between investment in physical capital and growth. The study is based on a three-equation structural system which was estimated using the two-stage least squares (2SLS). The study concludes that in African nations, the sources of labour productivity growth in the medium term are higher investments in physical and human capital.

In a cross-country study, Adeyemi et al (2006) examined the determinants of human development in Sub-Saharan Africa. The study is based on a multiple regression analysis estimated using the ordinary least square technique. The results indicated that factors like the extent of conflicts; the occurrence of a natural disaster; external debt crisis; macroeconomic instability; international trade; lack of access to water and the prevalence of HIV/AIDS impacted negatively on human development in the sub-region. Using a similar approach, Binder and Georgiadis (2010) examined the determinants of human development for 84 countries from 1970 to 2005. The study is based on a dynamic panel modelling framework and findings show that macroeconomic policies affect economic development with less delay than human development with a longer delay.

In a country-specific study, Simko and Tuicu (2015) examined the determinants of human capital for the Swedish municipalities based on cross-sectional regression and found that cultural diversity and specialization in knowledge-based manufacturing are the biggest determinants of human capital. Another study by Shuaibu and Oladayo (2016) investigated the determinants of human capital development in 33 African countries over 14 years from 2000 to 2013. The study employed is based on panel cointegration and causality analysis. Findings show that education, health, institutional quality and infrastructural development significantly influence human capital development in the long run.

In a study of the determinants of human capital development in BRICS nations, Rastogi and Gaikwad (2017) employed the fixed effect panel data regression procedure, covering from 2005 to 2015 for Brazil, Russia, India, China, and South Africa. The results show that the gross domestic product (GDP) and foreign direct investment (FDI) are positively and significantly associated with human capital development for BRICS nations. Ubi-Abai and George-Anokwuru (2018) employed the three-stage least squares (3SLS) in an empirical

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analysis of the determinants of human capital formation in Nigeria. The study finds evidence of bi-directional positive and significant relationships between health expenditures and growth, and a bi-directional negative and significant relationship between education expenditures and economic growth. The further reveals that the mortality rate had a positive relationship with expenditures on health. In investigating the determinants of human capital development in emerging markets, Tsaurai (2018) employed the pooled OLS, fixed effect and random effect panel data regression for the period 1994-2014. The study found that economic growth, foreign direct investment, financial development, trade openness and infrastructural development had either a significant positive influence or positive but insignificant impact on human capital development.

The analysis of the literature in the field shows a focus of panel studies on the determinants of human capital development; these types of studies incidentally hide country-specific characteristics and may not adequately drive policymaking. To this end, we focus on this knowledge gap as literature survey, to the best of our efforts, confirms Ubi-Abai and George-Anokwuru (2018) (which employed the three-stage least squares) as the only study that has attempted this endeavour in recent times for the Nigerian economy.

### 3. Research Methods

The links between the institution and human development are complex because human development is a multidimensional concept. Sen's Capabilities Approach, which posits a person's capability to have various functioning vectors and to enjoy the corresponding well-being achievements to be the best indicator of human welfare, provides the theoretical framework for this study. This perspective perceives human development as depending on a vector of attributes such as income, education, health, as well as a vector of possible opportunities available to individuals. For instance, a starving or uneducated person would have fewer choices than a healthy, educated person. The capability approach attaches relevance to the role of institutions for human development (Sen, 1999). Institutional and development policies come together to make development less uneven, and to create equal development opportunities for all in a bid to improve living standards. Thus, the theoretical model of our study is specified as:

$$HCD = f(Z) \quad (1)$$

Where HCD is human capital development and Z is a vector of exogenous variables (capability shifters). Equation 1 reveals Sen's theory of human development as an expansion of human capabilities, which is the starting point for the human development approach: the idea that



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the purpose of development is to improve human lives by expanding the range of items which a person can be and do, such as to be healthy and well-nourished, to be knowledgeable, and to participate in community life. Therefore, the focus of human development is on removing the obstacles to what a person can do in life such as illiteracy, ill health, lack of access to resources, as well as lack of civil and political freedoms.

We therefore adopt with modifications, the empirical model of Shuaibu and Oladayo (2016), which is based on the Sen's Capabilities Approach and we specify the human capital development model as:

$$HCD = f(HEX, EEX, PGDP, EMP, CPI, INFERS, DEMO) \quad (2)$$

Where HCD is human capital development measured in terms of human development index; HEX is health expenditure (% of total expenditure); EEX is education expenditure (% of total expenditure); PGDP is growth of real per capita GDP (%); EMP is rate of employment (%); CPI is consumer price index; INFERS is index of infrastructural development; DEMO is democracy which captures institutional framework (dummy variable with the value 0 for the non-democratic era, 1985-1998; 1 for the democratic era, 1999-2017). Specifying (2) in its full econometric form, we arrive at (3):

$$HCD = \Omega_0 + \Omega_1 HEX + \Omega_2 EEX + \Omega_3 PGDP + \Omega_4 EMP + \Omega_5 CPI + \Omega_6 INFERS + \Omega_7 DEMO + \mu \quad (3)$$

$(\Omega_1 - \Omega_4, \Omega_6, \Omega_7 > 0; \Omega_5 < 0)$

Where  $\Omega_0$  is the intercept term;  $\Omega_1 - \Omega_7$  are parameters to be estimated;  $\mu$  is the stochastic error term, with the usual properties of randomness, zero mean and constant variance. We employed annualized secondary time series data from Central Bank of Nigeria Statistical Bulletin from 1985 to 2017. All analyses were performed using Eviews version 10.

Our study hypothesizes that health expenditure (HEX), education expenditure (EEX), economic growth (PGDP), democratic governance (DEMO), employment (EMP), general price level (CPI), and infrastructural development (INFERS) do not significantly drive human capital development in Nigeria in the long run. We reject this null hypothesis for each variable if the estimated coefficient of the regressor is individually statistically significant at the 5% level.

In estimating our model, we employed a bound test within the autoregressive distributed lag framework as advanced by Pesaran et al. (2001) for cointegration analysis. This procedure has numerous advantages over its alternative because, first, it has better small sample properties. Secondly, the ARDL bounds testing is based on estimating an unrestricted ECM



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which seems to take satisfactory lags that captures the data generating process in a general-to-specific framework of specification (Laurenceson & Chai, 2003). The method avoids the classification of variables as  $I(1)$  and  $I(0)$  by developing bands of critical values which identifies the variables as being either stationary or non-stationary processes. Unlike other cointegration techniques (e.g., Johansen's procedure which require certain pre-testing for unit roots and that the underlying variables to be integrated of the same order), the ARDL model provides an alternative test for examining a long-run relationship regardless of whether the underlying variables are purely  $I(0)$  or  $I(1)$ , or fractionally integrated, hence the pre-test of unit root on variables is not customary. Moreover, the traditional cointegration methods may also suffer from the problems of endogeneity bias while the ARDL method can distinguish between dependent and explanatory variables. Thus, estimates obtained from the ARDL method of cointegration analysis are unbiased and efficient, since they avoid the problems that may arise in the presence of serial correlation and endogeneity bias. Note also that the ARDL procedure allows for uneven lag orders, while the Johansen's VECM does not. However, Pesaran and Shin (1999) argued that appropriate modification of the orders of the ARDL model is sufficient to simultaneously correct for residual serial correlation and problem of endogenous variables.

The ARDL bound test can be used with a mixture of  $I(0)$  and  $I(1)$  data; it involves just a single-equation set-up, making it simple to implement and interpret; and different variables can be assigned different lag-length as they enter the model. Following our empirical model, ARDL bounds testing procedure involves estimating the following generic form of an unrestricted error correction model:

$$\begin{aligned} \Delta HCD_t = & \alpha + \sum \beta_i \Delta HCD_{t-i} + \sum \delta_j \Delta HEX_{t-j} + \sum \lambda_k \Delta EEX_{t-k} + \sum \phi_l \Delta PGDP_{t-l} + \sum \gamma_m \Delta EMP_{t-m} + \sum \theta_n \Delta CPI_{t-n} \\ & + \sum \pi_p \Delta INFRS_{t-p} + \sum \omega_q \Delta DEMO_{t-q} + \delta_1 HCD_{t-1} + \delta_2 HEX_{t-1} + \delta_3 EEX_{t-1} + \delta_4 PGDP_{t-1} + \delta_5 EMP_{t-1} + \\ & \delta_6 CPI_{t-1} + \delta_7 INFRS_{t-1} + \delta_8 DEMO_{t-1} + \mu \end{aligned} \quad (4)$$

Equation 4 presents the unrestricted ECM version of the ARDL specification. The bound test is based on the joint F-statistic whose asymptotic distribution is nonstandard under the null hypothesis of no cointegration (Pesaran et al. 2001). The first step in the ARDL bounds test approach is to estimate equation (4) by the ordinary least square method to test for the existence of a long-run relationship among the identified determinants of human capital development by conducting an F-test for the joint significance of the coefficients of the lagged level of all the variables.

Our F-statistic which normalizes on  $HCD$  is denoted with  $F_{HCD}$  ( $HCD/ HEX, EEX, PGDP, EMP, CPI, INFRS, DEMO$ ). The F-test has a nonstandard distribution which depends upon: (i) whether variables included in the ARDL model are  $I(0)$  or  $I(1)$ ; (ii) the number of regressors;

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and (iii) whether the ARDL model contains an intercept and/or a trend. Two sets of critical values are reported in Pesaran et al. (2001): one set is calculated assuming that all variables included in the ARDL model are  $I(0)$  and the other is estimated considering that the variables are  $I(1)$ . We reject the null hypothesis of no cointegration when the F-statistic exceeds the upper critical bounds value, vice versa, and the decision is inconclusive if the calculated F-statistic falls between the lower and upper-bound critical values.

## 4. Results and Discussion of Findings

We begin this section with the presentation of the summary statistics of the relevant variables and the results are reported in Table 1. The average values of human capital development (HCD), health expenditure (HEX), education expenditure (EEX), per capita GDP growth rate (PGDP), employment rate (EMP), consumer price index (CPI), and infrastructural development index (INFRS) are approximately 0.48, 10.2%, 12.9%, 3.33%, 41.2%, 77.4, and 37.4 respectively. This indicates that Nigeria has a very poor average human capital development over the period under review. From the average values of health and education expenditures, it could be stated that the percentage of total government expenditure allocated to health and education is still very low when compared to the UN benchmark, and this may be the reason for the poor average human capital development in Nigeria. It can also be stated that the average growth rate of income per head of the GDP is still very low, and this may have something to do with the poor average human capital development in Nigeria.

Furthermore, the probability values of the Jarque-Bera statistic for each of the variables that all the variables are normally distributed. This is supported by the values of skewness for each variable which are barely different from zero. Interestingly, the values of the kurtosis suggest that other variables are platykurtic except HCD, EEX, and PGDP which are leptokurtic. Finally, most of the variables have a high standard deviation, meaning that they have a high deviation from their respective mean values.

**Table 1: Summary of Descriptive Statistics (1985-2017)**

	HCD	HEX	EEX	PGDP	EMP	CPI	INFRS
Mean	0.482983	10.17009	12.90284	3.232236	41.18349	77.39421	37.38607
Median	0.256458	8.242978	7.138071	3.092033	42.40000	56.53564	33.04054
Maximum	0.520150	21.68105	23.80853	5.902778	67.80000	314.3667	100.0000
Minimum	0.443430	0.463344	0.296341	-3.28519	14.12000	0.237754	1.500000
Std. Dev.	2.155686	6.150431	1.042508	0.957379	7.605945	5.212005	5.237216
Skewness	0.215618	0.548877	0.947433	0.349841	0.382772	0.452376	0.716029
Kurtosis	3.495850	1.200407	3.073704	3.218537	2.513016	2.341963	2.687895
Jarque-Bera	6.637866	7.249537	5.132018	1.139548	4.124775	8.243350	5.411203
Probability	0.101752	0.094323	0.110475	0.372650	0.137649	0.083547	0.109832
Sum	15.93844	335.6129	425.7937	106.6638	1359.055	2554.009	1233.740

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	HCD	HEX	EEX	PGDP	EMP	CPI	INFRS
Obs.	33	33	33	33	33	33	33

Source: Authors' Computation using EVIEWS 10

Although unit root test is not a customary practice when using the ARDL bound test for cointegration analysis, the need to carry out this test is to ensure that none of the chosen variables is I(2) because ARDL bound test makes no meaning in the face of I(2) variables. The results from both ADF and PP unit root tests as reported in Table 2 show that variables: HCD, HEX, PGDP and EMP are all I(1) variables, whereas EEX, CPI and INFRS are I(0) variables. This implies that we can proceed to the ARDL bound test as the chosen variables are a mixture of I(0) and I(1).

**Table 2: ADF and PP Unit Root Test Results**

Variable	ADF Statistic	Order of Integration	PP Statistic	Order of Integration
HCD	-7.392168**	I(1)	-7.358198**	I(1)
HEX	-6.184849**	I(1)	-6.193463**	I(1)
EEX	-3.193674*	I(0)	-3.269573*	I(0)
PGDP	-3.285188*	I(1)	-3.123475*	I(1)
EMP	-5.322891**	I(1)	-5.319518**	I(1)
CPI	-4.627197**	I(0)	-4.728889**	I(0)
INFRS	-3.251357*	I(0)	-3.264904*	I(0)

NB: \*\*(\*) implies significant at 1%(5%) level of significance.

Source: Authors' Computation using EVIEWS 10

Table 3 presents the ARDL bound test result for cointegration and the results show that there is a long-run relationship between human capital development and its identified determinants. This is identified in the F-statistic of 4.344641. This statistic which shows the joint significance of lagged levels of explanatory variables is greater than the upper bound critical values of 3.99 and 3.28 at 1% and 5% levels of significance respectively.

**Table 3: ARDL Bound Test Results for Cointegration**

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	4.344641**	7
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

NB: \*\* indicates significant at 1% and 5% levels.

Source: Authors' Computation using EVIEWS 10

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*Drivers of Human Capital Development: Evidence from Nigeria***Table 4: Estimated Long run Coefficients**

<b>Dependent Variable: HCD</b>					
<b>Levels Equation</b>					
<b>Case 3: Unrestricted Constant and No Trend</b>					
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>	
HEX	0.540774**	0.086165	6.275999	0.0000	
EEX	0.214994**	0.038717	5.552933	0.0000	
PGDP	0.110487**	0.026390	4.186717	0.0002	
EMP	0.066805*	0.025844	2.584909	0.0147	
CPI	-1.61900**	0.383443	-4.222276	0.0002	
INFRS	0.033760	0.022530	1.498435	0.1441	
DEMO	0.092183	0.075706	1.217620	0.1631	

NB: \*\*(\*) indicates significant at 1%(5%) level

Source: Authors' Computation using EVIEWS 10

Table 4 presents the estimated long-run coefficients of determinants of human capital development in Nigeria. Our findings reveal that all the explanatory variables conformed to our a priori expectations, and variables such as health expenditure, education expenditure, growth in real per capita GDP, employment rate, and inflation rate were individually statistically significant at 5% level, whereas infrastructural development and democracy were not. The results show that health and education expenditures positively and significantly impact on the level of human capital development in Nigeria. This rejects the null hypothesis that health and education expenditures are not the significant determinants of human capital development in Nigeria. The implication is that policy actions targeted at increasing health and education expenditures are expected to increase (decrease) the level of human capital development in Nigeria. This provides some support for Ravallion (1991), Shuaibu and Oladayo (2016), Ubi-Abai and George-Anokwuru (2018). Thus, a percentage increase in health and education expenditures are expected to bring about 0.54% and 0.21% increase in human capital development respectively. In terms of magnitude, the contribution of health expenditure to human capital development out-weighs that of education expenditure in Nigeria. This should equally be an important policy signal to the government in during expenditure allocation between health and education in Nigeria.

Our results also reveal that the growth of real per capita income and increase in the rate of employment would bring about significant improvement in human capital development in Nigeria. This is consistent with the finding by Rastogi and Gaikwad (2017), and Tsauroi (2018). Therefore, a percentage increase in the growth of real per capita income and employment rate will translate into about 0.11% and 0.07% increase in the level of human capital development. This implies that policy actions geared towards the adjustment of economic growth and employment (economic growth and employment policies) will significantly result in improvement in human capital development in the country. Furthermore, the consumer price index which captures price stability is negatively related to

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human capital development in Nigeria. This means that unpredictable rises in the general price level tend to undermine the development of human capital in Nigeria. Thus, a percentage increase in the general price level of goods and services will result in -1.62% declines in the level of human capital development in Nigeria.

The results further reveal that the index of infrastructural development and democratic governance are not serious determinants of human capital development in Nigeria. This finding contradicts some of the conclusion arrived at by Shuaibu and Oladayo (2016), and Tsaurai (2018), and further contradicts the human capital theory. Hence, it is of note that, except for infrastructural development and the democratic governance, all other variables of this study form serious policy instruments for determining the level of human capital development in Nigeria.

### Post-Estimation Diagnostic Test for the Validity of Results

We went further to conduct various diagnostic tests to ascertain the validity, appropriateness and stability of our model as well as the robustness of the results as advanced by Davidson and Mackinnon (1999). Results in Table 5 show no evidence of serial correlation and heteroskedasticity in our model. The p-value of the normality test exceeds 0.05 and this implies that the residues are normally distributed. The estimated model has no specification error given that the result of the Ramsey RESET test could not reject the null hypothesis that the estimated model is rightly specified.

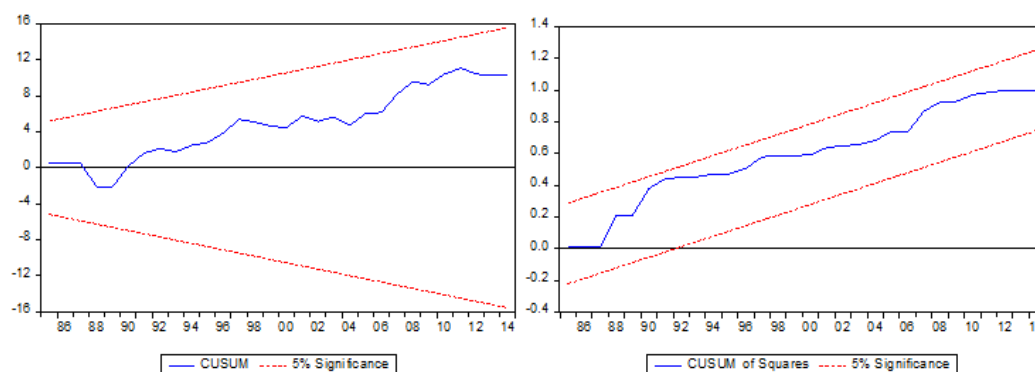
**Table 5: Post-Estimation Diagnostic Test for the Validity of Results**

Test	Null Hypothesis	Statistic	Prob.
Jarque-Bera	There is a normal distribution	2.777	0.24
Breusch-Godfrey LM	No serial correlation	1.602	0.23
Breusch-Pagan-Godfrey	No conditional heteroskedasticity	0.712	0.70
Ramsey RESET	No Model Specification Error	0.915	0.49

Source: Authors' Computation using EViews 10

The stability tests further show that our human capital development model is stable as the plots of the charts lie within the critical bounds at 5% significant level as advocated by Bahmani-Oskooee and Rehman (2005). These stability tests are based on cumulative sum (CUSUM) and cumulative sum of squares (CUSUMQ) reported in Figure 1.

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Source: Authors' Computation using EVIEWS 10

**Figure 1: Stability Test based on CUSUM and CUSUM of Squares**

## 5. Conclusion

Most studies on the determinants of human capital development in Africa are cross-country (see Ravallion, 1991; Oketch, 2005; Sidikat et al, 2006; Binder & Georgiadis, 2010; Shuaibu & Oladayo, 2016; Rastogi & Gaikwad, 2017; Tsaurai, 2018). Information on country-specific studies is rare and, specifically, studies on the drivers of human capital development in Nigeria are limited. Following a review of the relevant theoretical and empirical literature, we identified several determinants of human capital development to include expenditure on health and education; growth of real per capita income; employment level; stable macroeconomic environment; index of infrastructural development and democratic governance. We, therefore, developed an empirical framework that accommodated an array of these identified determinants and we further employed the contemporary econometric techniques of cointegration within the framework of the ARDL model. Our study found government health expenditure, government education expenditure, growth in real per capita GDP, employment rate, and inflation rate to have statistical significance at 5% level, with only the inflation rate impacting negatively on human capital development in Nigeria. The infrastructural development index and democracy variables did not impact significantly on human capital development as expected even though their coefficients are positive. In some ways, our study provides some support for Ravallion (1991), Shuaibu and Oladayo (2016), Ubi-Abai and George-Anokwuru (2018), Rastogi and Gaikwad (2017), and Tsaurai (2018), and in another way, contradicts some of the conclusion made by Shuaibu and Oladayo (2016), and Tsaurai (2018) and further contradicts the human capital theory. Hence, it is of note that, except for infrastructural development and the democratic governance, all other variables of this study form serious policy instruments for determining the level of human capital development in Nigeria.

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The outcomes of our study have important policy implications for human capital development in Nigeria. Apart from identifying the key drivers of human capital development in Nigeria, our results are also important as they provide both quantitative and qualitative policy framework for the government in its efforts to develop human capital. Second, the qualitative policy framework is derived from the signs of the estimated coefficients generated from the analyses, while the quantitative policy framework comes from the magnitude of the estimated parameters from the empirical investigation. We, therefore, recommend policy intervention in the area of provision of infrastructure that provides the foundations for economic activities and therefore, constitutes a major sector of the economy given its contribution towards raising welfare. These areas should include the provision of public electricity supply and good road networks. Nigeria's democracy should be geared towards improving the welfare of its citizens to create income and well-being enhancing opportunities needed to boost human development. We further recommend policy intrusion towards ensuring lower inflation rates with steady growth in real per capita income.

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