Sustaining Human Capital Development in Nigeria : An Exposition

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Abstract

Over the years, the primary focus of the Nigerian government has been infrastructure, and little attention has been paid to the development and sustenance of human capital, especially on education and health. This negligence by the government is evident in the Human Development Index of the country over time, which has remained low for a long period. This paper, therefore, investigated the determinants of human capital development in Nigeria using the Autoregressive Distributed Lag modelling approach to co-integration. The study employed time series data of life expectancy, average income, environmental conditions, access to infrastructure, public expenditure on health and education from 1987 to 2017 and found long-run relationship among the variables. The results showed that in the long run, average income significantly improved life expectancy, and indeed, human capital development, with a sluggish speed in the adjustment to transitory shocks. In the short run, previous expenditures on education and health are important factors. Adequate attention should be paid to improving the average income of citizens while ensuring unfettered allocation to the education and health sectors in a bid to develop and sustain human capital in Nigeria.

Keywords: Human capital, government spending, education, health, income, Nigeria

Introduction

The importance of human capital[1] in economic growth has been explained in the neo-classical growth theory and examined theoretically by North and Thomas (1973), who noted that the development of human capital underlies that of physical capital, and indeed, of growth. The magnitude of the significance of human capital in growth is enhanced when combined with some other factors like institutions. Countries with weak institutions and low level of human capital tend to struggle to grow. It is therefore relevant to understand factors driving human capital, especially in developing countries that are desirous of development.

In the recent past, policy initiatives in developing countries, especially in sub-Saharan African (SSA) countries, have followed that of the World Bank and the International Monetary Fund (IMF), which packaged programmes towards restructuring the economy. Elements of such programmes did a disservice to spending on human capital while promoting others, such as military expenditure (Stevenson, 2000; Nooruddin and Simmons, 2006). As a result, SSA countries have suffered considerable dents in their human capital development. Indeed, the human capital index (2018) of the World Bank noted that SSA countries are mostly low on the index. Among the least ranked are six countries in West Africa (Sierra Leone, Nigeria, Liberia, Mali, Niger and Chad). The dynamics of growth in these countries are often driven by the vagaries of commodity prices. A classic example is Nigeria, the biggest economy in the group, even in Africa, whose growth patterns mimic the price of the main stay of its economy, crude oil.

To address this mono-culture economy problem, several economic diversification policies have been implemented in Nigeria, but more often than not, the development of human capital has not been in the front line of these policies, notwithstanding the prodigious evidence in the literature of

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[1] Behrman and Schneider (1992) succinctly described human capital as being generated by investments in human beings in the form of education through formal schooling, training and various adult education programmes and through investments in health and nutrition, which are often referred to as demographic developments that affect the size of the population, such as fertility, mortality and migration.

its largely growth-enhancing influence. A few examples will suffice. Oketch (2006) and Altiner and Toktas (2017) noted that human capital is important for economic growth. Oketch (2006) identified that both human and physical capital investments are necessary for Africa to develop and that human capital (resource) determines investment in physical capital, which in turn, contributes significantly to per capita growth. This conclusion was confirmed by Altiner and Toktas (2017) in their study on the importance of human capital in growth dynamics for 32 developing countries, where a positive impact was found, although with a lower coefficient than that of physical capital. Other studies with similar conclusion include Bils and Klenow (2000), and Ogundari and Awokuse (2018). However, Benhabib and Spiegel (1994) noted a negative relationship between human capital and productivity.

Given the established importance of human capital to growth across countries, it is imperative to ensure that human capital is developed and also to understand the dynamics of human capital development so as to guarantee sustainable growth. To this end, a few studies have identified factors that can sustain the development of human capital in Africa with evidence from either a panel or country-specific analysis. Shuaibu and Oladayo (2016), in their study of human capital dynamics in 33 African countries found a long-run relationship among public expenditure on health, infrastructural expansion, and better institutions; and economic growth significantly influenced human capital development captured by the human development index. Some other studies such as Ţuicu and Šimko (2015) analysed the relationship at the municipal level with a focus on the importance of several determinants of human capital accumulation; including the human capital index, based on education, creativity and health. The results from the cross-sectional regression analysis showed that the determinants with the biggest impact on human capital in Sweden turned out to be cultural diversity and specialization in knowledge-based manufacturing. Studies specific to Nigeria are rare, thus, this area is worth examining. Therefore, the main objective of this study is to identify the key determinants of human capital in Nigeria.

Review of the Literature

Human capital is a widely discussed concept in economic literature. The concept was introduced the in the 1960s in a notable study by Schultz

(1961), and later by Becker (1964). Since then, human capital has been considered as investment in education, which should increase the stock of skills and productive knowledge in people. Subsequent studies then examined the returns on this investment, which are broadly classified either as private or social. A number of studies have found that private rate of returns to education drives the individual demand for education (Hartog et al., 1999). The importance of social rate of return to investment in education has also been explored in the literature in cross-country (Heckman and Klenow, 1997) and micro (Rauch, 1993; Acemoglu and Angrist, 1999) analyses. Recent investigations have been mainly devoted to examining the impact of human capital on economic growth, of which the majority of the studies noted a positive relationship while a few found the contrary (see Benhabib and Spiegel, 1994). Only a few have been devoted to understanding the drivers to sustain human capital development, especially at country-specific level in sub-Saharan Africa. This section therefore focuses only on the limited studies that have attempted to investigate the drivers of human capital development.

Olayemi (2012), in his study, found that total expenditure on education maintained a positive long-run relationship with the index of industrial production while total expenditure on health and gross capital formation exhibited a long-run negative relationship with index of industrial production.

Shuaibu and Oladayo (2016) studied the determinants of human capital development (HCD) in Africa, to account for factors that drove HCD in 33 African countries between 2000 and 2013 from a pool of variables such as HCD (human development index (HDI) proxy), public expenditure on education, public expenditure on health, growth rate, institution quality and access to infrastructure. The results obtained from using the Panel causality test showed that there was a positive long-run relationship between HCD and all the variables. Also, there was a bi-directional link between per capita growth and HCD. Furthermore, a unidirectional link was detected which showed that HCD would cause all other variables without any reverse causation except for health expenditure.

In Zulkifli et al. (2017), there was no significant relationship between human capital development (HCD) and unemployment, foreign direct investment and the growth rates in Malaysia; however, there was a positive

significant relationship between educational level and HCD. On the other hand, Ubi-Abai et al.(2018) found out that there is a positive significant relationship between expenditure on health and the growth of the economy in Nigeria. They also asserted that there is a positive relationship between enrolment and expenditure in education. However, their research revealed a negative significant relationship between expenditure on education and gross domestic product (GDP) during the period under study.

Other studies follow the investigation along the line of linking human capital development with economic growth. Park (2004) asserted that there is strong evidence that both the average index and dispersion index of human capital contribute positively to productivity growth. The dispersion index of human capital has a stable positive sign and its coefficient is robustly significant. In general, the highly educated creative group is the most relevant one in explaining production efficiency.

Bildirici et al. (2005) analysed the relation between human capital growth and brain drain in 77 countries. Using the theory of human capital, their analysis shows that when unemployment, wages and per capita income increases, migration decreases. The study also emphasised that variables such as education index, adult literacy rate, schooling rate, educational investments, per capita income, growth rate, and average life are positively related to human capital in virtually all the 77 countries studied. On the other hand, in low developing countries, the pace of increase in urban population average life expectation index, imports, exports, and wages affect growth negatively.

Colantonio et al. (2010) researched on human capital and economic development. Results show that there was a high correlation between the indicators of health, education and economic development. Abbas and Foreman-Peck (2008) worked on human capital and economic growth with the aim to investigate the nexus between human capital and economic growth in Pakistan. The analysis carried out unveiled that human capital is estimated to have accounted for one-fifth of the increase in Pakistan's GDP per head.

Anyanwu et al. (2015) examined HCD and economic growth in Nigeria between 1981 and 2010. They examined the long run and short run impact of HCD on economic growth in Nigeria, using the endogenous growth model and the Autoregressive Distributed Lag (ARDL) framework.

They found that human capital-based technological production is a significant driver of economic growth. However, Cadil et al. (2014) found that human capital endowment accelerated the rate of unemployment.

Methodology and Model Specification

This section entail exposes the theoretical framework, data collection, model(s) specification and method of analysis employed in the empirical research to investigate the determinants of human capital development in Nigeria.

Theoretical framework

The theoretical framework adopted is Sen's capability approach (Sen, 1979; 1999). Sen's capability approach goes well beyond the narrow notion of material well-being in acknowledging not only the instrumental value of education in promoting productivity, economic growth and individual incomes, but also its importance for individual well-being and social development (Chiappero-Martinetti and Sabadash, 2014). In the capability paradigm, poverty is understood as deprivation of basic capability (Shuaibu and Oladayo, 2016). The scope of this theory is vast, the capability factors include: social and political processes, gender inequality and discrimination of all types, social exclusion, disability, environmental conditions, as well as personal and psychological factors. Sen's capability approach on human development model focuses on two major things: freedom to achieve and the capability to function. The capability approach attaches relevance to the role of institutions in human development (Sen, 1999).

The algebraic expression of the theoretical framework is:

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

where:

HCD = Human capital development

Z = Vector of exogenous capability factors

Model specification

The model adopted for this study is founded on Sen's capability theory of human capital development and specified following the exposition

of Binder and Georgiadis (2011), modified by Shuaibu and Oladayo (2016). Nonetheless, our model varies from the modification; the model specified by this study considers environmental conditions and average income as contributing drivers of HCD in Nigeria.

The model is expressed below:

$$HCD = f(\ INC, INFRA, ENV, PEE, PEH\ ) \tag{2}$$

Equation (2) is expressed in econometrics form:

$$HCD_t = \alpha_0 + \alpha_1 INC + \alpha_2 INFRASUBt + \alpha_3 ENV_t + \alpha_4 PEE_t + \alpha_5 PEH_t + \eta_t \tag{3}$$

where:

HCD = Human capital development (proxied by life expectancy)
INC = Average income
INFRA = Access to infrastructure
ENV = Environmental conditions
PEE = Public expenditure to education
PEH = Public expenditure on health

The respective expectations are indicated in Table 1.

Introducing the natural log (LN) into equation 3 in order to bring the variables to an agreeable indexation, the new model is:

$$\ln HCD_t = \alpha_0 + \alpha_1 \ln INC + \alpha_2 \ln INFRASUBt + \alpha_3 \ln ENV_t + \alpha_4 \ln PEE_t + \alpha_5 \ln PEH_t + \eta_t \tag{4}$$

Table 1: Aprior expectation

Variables	Definitions	Expected Signs
INC	This is the level of average income in Nigeria. The study relied on GDP per capita income as the proxy for average income.	It is expected to be positive. The higher the per capita the higher the HCD proxy by life expectancy.
INFRA	This is access to infrastructure. It is defined as the percentage of the population that has access to electricity.	It is expected to be positive. Infrastructure contributes to the improvement of welfare.
ENV	This is environmental condition. This study employed CO_2 emission as the proxy for environmental conditions.	It is expected to be negative. Increasing environmental degradation is expected to exert a negative effect on HCD.
PEE & PEH	These are public expenditure on education and health respectively. They capture domestic absorption on HCD in the health and education sectors.	Government expenditures on the health and education sectors exert a positive influence on HCD.

Source: Compiled by Author.

Using equation 4, the general ARDL representation is specified as:

$$\Delta \ln HCD_t = \alpha_0 + \sum_{i=1}^{n} \beta_i \Delta \ln HCD_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta \ln INC_{t-i} + \sum_{i=0}^{q} \gamma_i \Delta \ln INFRA_{t-i} +$$

$$\sum_{i=0}^{k} \theta_i \Delta \ln ENV_{t-i} + \sum_{i=0}^{r} \phi_i \Delta \ln PEE_{t-i} + \sum_{i=0}^{s} \lambda_i \Delta \ln PEH_{t-i} + \eta_1 \ln HCD_{t-1} +$$

$$\eta_2 \ln INC_{t-1} + \eta_3 \ln INFRA_{t-1} + \eta_4 \ln ENV_{t-1} + \eta_5 \ln PEE_{t-1} + \eta_6 \ln PEH_{t-1} + e_t \quad (5)$$

where:

All variables are as previously defined

Δ is the difference operator

e_t is the error term

To trace the existence of co-integration, the F-statistic is computed from the OLS regression of equation 5. The null hypothesis of no co-integration is tested by restricting the lagged level variables equal to zero

(i.e., $\eta_1 = \eta_2 = \eta_3 = \eta_4 = \eta_5 = \eta_6 = 0$) against the alternative hypothesis that $\eta_1 \neq \eta_2 \neq \eta_3 \neq \eta_4 \neq \eta_5 \neq \eta_6 \neq 0$. The bounds tests provide two asymptotic critical value bounds. The lower bound assumes variables are I(0) while the upper bound assumes I(1) variables. The null hypothesis of no co-integration is rejected (i.e. there is co-integration) if the computed F-statistic is greater than the upper critical value bound, otherwise the null hypothesis is not rejected.

Based on equation 5, the following ARDL-based error correction model required for the short-run result is specified as follows:

$$\Delta \ln HCD_t = \alpha_0 + \sum_{i=1}^{n} \beta_i \Delta \ln HCD_{t-i} + \sum_{i=0}^{p} \varphi_i \Delta \ln INC_{t-i} + \sum_{i=0}^{q} \gamma_i \Delta \ln INFRA_{t-i} +$$

$$\sum_{i=0}^{k} \theta_i \Delta \ln ENV_{t-i} + \sum_{i=0}^{r} \phi_i \Delta \ln PEE_{t-i} + \sum_{i=0}^{s} \lambda_i \Delta \ln PEH_{t-i} + \delta ECT_{t-1} + \epsilon_t$$

where $\beta_i, \varphi_i, \gamma_i, \theta_i, \phi_i,$ and λ_i represent the short-run coefficient and δ the extent of disequilibrium correction.

Data collection

Time series secondary data were collected from the World Bank and the Central Bank of Nigeria Statistical Bulletin over 31 years (1987-2017) because of availability of data for these years. The study indexed human capital development as the dependent variable and independent variables were environmental conditions, average income, access to infrastructure, public expenditure on health and education.

Empirical Analysis

Unit root test

The results of the Augmented Dickey-Fuller (ADF) unit root tests for the relevant variables are shown in Table 2. The table shows that LNHCD and LNPEE are stationary at level while LNINC, LNPEH, LNENV and INFRA are stationary at first difference. This is the incentive behind the choice of ARDL as an econometric technique.

Table 2: Unit root test results (ADF)

	t-Statistics	Prob.	Level
ln*HCD*	-4.717	0.001	I(0)
ln*INC*	-4.183	0.003	I(1)
*ln*PEH	-8.099	0.000	I(1)
ln*PEE*	-8.816	0.000	I(0)
ln*ENV*	-5.024	0.000	I(1)
INFRA	-4.773	0.001	I(1)

Source: Authors' computation.

The summary of the unit root test result is that the variables are stationary either at level or first difference. In other words, the series are integrated at different orders, a combination of level and first difference stationarity. To this effect, there is a need for a co-integration test to establish whether or not a long-run relationship exists. However, the use of the Johansen co-integration test is not valid, therefore, the appropriate co-integration test is the bounds test proposed by Pesaran Shin and Smith (2001).

The ARDL-bounds test

The bounds *F*-test for co-integration yields evidence of a long-run relationship between HCD and its determinants. The computed F-statistic, 5.626, is greater than the upper bound critical values. This indicates that there is a long-run relationship between the variables. The result of the bounds test shows that the variables are co-integrated, therefore, the model to be estimated is the long-run equation. Equation 6 allows for the estimation of the long-term using the error correction term (ECT) in the model specified. To successfully carry out the long-run estimation, the optimal lag structure is obtained (Table 4), indicating an optimal lag of 3 to estimate the specified model. The lag structure used was selected by Hannan–Quinn (HQ) information criterion which is in conformity with the lag length criterion in the table.

Table 3: Bound test results for co-integration

Test Statistic	Value	k
F-statistic	5.626	5
Critical Value Bounds		
Significance	*I*(0) Bound	*I*(1) Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Author's computation.

Table 4: Lag structure result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-54..435	NA	0.000	4.317	4.602	4.404
1	95.540	224.963*	0.000	-3.824	-1.826*	-3.213
2	141.636	49.388	6.79e-10*	-4.545	-0.834	-3.411
3	185.319	28.082	0.000	-5.0942*	0.330	-3.436*

Source: Author's computation.

Table 5 presents the results of the long-run estimates. The results show that the coefficients of average income, infrastructure and public expenditure on education have positive signs, as expected, however, only the average income is statistically significant at the 5% level. Against this expectation, public expenditure on health was negative, although not significant. This poses a conundrum but a plausible explanation is that an ample part of health expenditure is on recurrent expenses, while capital expenditure in the health sector is not enough to uplift life expectancy (human capital). While the environment (CO_2 emission) has a deleterious effect on life expectancy, though insignificantly, it should be noted that the significant determinant of human capital development in this study is income level. A one percent increase in average income leads to about 0.36% increase in human capital development.

Table 5: Long-run Estimates Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNINC	0.355	0.086	4.115	0.003
INFRA	0.002	0.002	0.897	0.393
LNENV	-0.001	0.025	-0.051	0.961
LNPEE	0.026	0.015	1.759	0.113
LNPEH	-0.038	0.022	-1.749	0.114
EC = LNHCD - (0.3546*LNINC + 0.0016*INFRA -0.0013*LNENV + 0.0257*LNPEE - 0.0382*LNPEH)				

Source: Author's computation.

Table 6 presents the short-run estimates coefficients of the determinants of HCD in Nigeria as well as the dynamic adjustment to the long-run equilibrium in the presence of an abrupt shock or shock. Results show that the previous level of human capital significantly determines the present level of human capital. Spending on key elements of human capital, that is, education and health, has no contemporaneous effect on human capital, but lag effects. Specifically, the previous spending on health has a positive and significant effect on human capital (life expectancy), while the previous spending on education has a negative effect. Infrastructure also has a positive and significant contemporaneous effect on human capital, however, infrastructure in the immediate period dampened human capital. In other words, life expectancy tends to be enhanced with new infrastructure, but the culture of neglect and non-maintenance of infrastructure in Nigeria hampers it. These determinants of human capital development were evaluated at the 5% level of significance. The coefficient of ECT(-1) is -0.235, which suggests a slow rate of the adjustment process. This lends credence to the earlier findings of the existence of a long-run relationship between HCD and its determinants in Nigeria. The coefficient indicates that the reversion to long-run equilibrium is at an adjustment speed of 23.5% in the first year. Therefore, it can be concluded that the speed of adjustment of HCD is slow in responding to transitory shocks.

Table 6: Short-run error correction model result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.090	0.013	-7.167	0.000
ln*HCD*$_{-1}$	0.994	0.093	10.702	0.000
INFRA	0.000	0.000	2.444	0.037
INFRA$_{-1}$	-0.001	0.000	-3.297	0.009
ln*ENV*	-0.001	0.004	-0.221	0.830
ln*ENV*$_{-1}$	0.002	0.003	0.773	0.459
ln*ENV*$_{-2}$	0.013	0.003	4.593	0.001
ln*PEE*	0.000	0.001	-0.247	0.811
ln*PEE*$_{-1}$	-0.005	0.001	-5.453	0.000
ln*PEE*$_{-2}$	-0.003	0.001	-4.122	0.003
ln*PEH*	0.000	0.001	-0.663	0.524
ln*PEH*$_{-1}$	0.007	0.001	6.810	0.000
ln*PEH*-$_{2}$	0.003	0.001	4.794	0.001
ECT(-1)*	-0.235	0.032	-7.247	0.000

R-squared 0.937; Adjusted R-squared 0.878; S.E. of regression 0.001; Sum squared residual 4.41E-05; Log likelihood 147.325; Hannan-Quinn criter.-9.319; F-statistic 16.033 (0.000); DW-stat 2.495

Source: Author's computation.

Diagnostic tests

Some diagnostic tests that were done are presented in Table 7. They are the Breusch-Godfrey serial correlation LM test, Heteroskedasticity Test: Breusch-Pagan-Godfrey, Jacque-Bera normality test, and Ramsey RESET test. These tests show that there is no serial correlation but there is the absence of heteroskedasticity, and the model is normally distributed. Hence, the results are reliable.

Table 7: Determinants of human capital development diagnostic tests

LM test statistics	Results
Breusch-Godfrey Serial Correlation: Prob. F(3,6)	1.658[0.273]
Breusch-Pagan-Godfrey Heteroskedasticity Test: Prob. F(18,9)	1.441[0.293]
Jarque-Bera: Prob.	0.066[0.967]
Ramsey RESET Test: Prob.	2.079[0.187]

Conclusion and Recommendations

The main objective of this paper was to determine the factors that sustain human capital development in Nigeria. The specified model leaned on Sen's human capital development framework because it provides a very clear explanation of factors that can sustain human capital development. The paper employed the Auto-regressive Distributed Lag modelling approach to co-integration analysis to establish the long-run relationship among the pertinent variables. In this study, life expectancy rate was used as a proxy for human capital development in Nigeria and existence of a long-run relationship between human capital development, average income (measured by per capita income), environment (CO2 emission), public expenditure on health, public expenditure on education, and infrastructure (percentage of population with access to electricity) was found. It was also observed that in the long run, average income, infrastructure, and public expenditure on education had positive effects on human capital development, however, only average income was significant at the 5% level.

The results of the short-run analysis indicate that previous level of human capital significantly determined the present level of human capital and that public spending on education and health had no contemporaneous effect on human capital, but lag effects. In addition, life expectancy tended to be enhanced by new infrastructure, but the culture of neglect and non-maintenance of infrastructure in Nigeria hampered it. Adjustment of HCD to transitory shocks was slow at 23.5% annually. This study, therefore, recommends that for human capital to be developed and sustained, particular attention should be paid to improving the average income of the citizen in the long run, while ensuring adequate budget allocation to health and education. Overall, existing empowerment programmes should be refocused to ensure sustainable jobs and livelihood.

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