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Human Capital Development and Macroeconomic Performance in Nigeria: An Autoregressive Distributed Lag (ARDL) Approach

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Abstract. *Developed nations continue to invest heavily in the development and training of their human resources. Huge budgetary allocations show it to education and health, yet Nigeria's human capital development policy has only been effective on paper. This study examined the impact of human capital development on the macroeconomic performance of Nigeria. Using the autoregressive distributed lagged (ARDL) model, this study shows an insignificant negative relationship between human capital development and per capita GDP in the short run. The results also showed that only the tertiary enrolment rate significantly and positively improved per capita GDP within the period under review. The study concluded that the government's efforts aimed at boosting human capital have been insufficient.*

Keywords: *human capital, macroeconomic performance, government expenditure, gross domestic product*

JEL classification: O47, J11, J24

Abstrak. *Negara-negara maju banyak melakukan investasi dalam pengembangan dan pelatihan tenaga kerjanya. Hal ini ditunjukkan dengan alokasi anggaran yang besar untuk pendidikan dan kesehatan, namun kebijakan pengembangan sumber daya manusia Nigeria hanya efektif di atas kertas. Penelitian ini meneliti dampak pengembangan sumber daya manusia pada kinerja ekonomi makro Nigeria. Menggunakan model ARDL, penelitian ini menunjukkan hubungan negatif yang tidak signifikan antara pengembangan sumber daya manusia dan PDB per kapita dalam jangka pendek. Hasilnya juga menunjukkan bahwa hanya angka partisipasi tersier yang secara signifikan dan positif meningkatkan PDB per kapita dalam periode yang dikaji. Studi ini menyimpulkan bahwa upaya pemerintah yang bertujuan untuk meningkatkan modal manusia masih belum memadai.*

Kata Kunci: *sumber daya manusia, kinerja ekonomi, pengeluaran pemerintah, produk domestik bruto*

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Introduction

Is there a linkage between human capital and the macroeconomic performance of a nation? While problems such as unemployment, poverty, high mortality, low income are known to bedevil the survival and performance of the Nigerian economy (Akeju & Olanipekun, 2014; Dauda, 2016; and Sede & Ohemeng, 2015). In other literature such as Isola & Alani (2012) Kanayo (2013), Ibok & Ibanga (2014) that the bane of Nigeria's economic development is traceable to her inability to develop a credible human capital base that would drive and propel the economy towards greater economic emancipation and growth. This condition is because per capita output growth remains an essential component of economic welfare and features as a significant macroeconomic policy of all governments, the world over (Idenyi et al., 2016).

There is an unending debate over the role played by human capital and technology. This role is essential to the advancement of the fortunes of an economy. While Omolara & Timothy (2014) captured the combining efforts of both human capital and technological development growth in boosting the growth of the economy, Çaliskan (2015) argues that the underlining differences in economic growth and income inequality between two countries mostly explained by the differences in the technological wit and might of these countries. Further, while new technologies have had the capacity to pave the way for production of new and cheaper goods and capital accumulation and to enhance the international competitiveness of individual countries (Çaliskan, 2015), yet, economic theory recognizes human beings as the most essential and promising source of growth in productivity and the economy at large (Pelinescu, 2015). For instance, the equipment and technology used today to advance the sciences are all products of creative human minds and can only be put to efficient use by humans. While technology continues to thrive and expand existing horizons in the world today, the role of humans remains as vital as it has always been.

In a country such as Nigeria, one of the most critical macroeconomic objectives of policymakers remains how to achieve sustainable economic growth (Oluseye & Gabriel, 2017). However, to achieve this macroeconomic objective, essential variables such as technological progress, foreign direct investment, trade openness, infrastructure development, industrialization become necessary (Adak, 2015; Owolabi-Merus, 2015; Ajide, 2014; Su & Yao, 2016), human capital and its development champions it all by expanding the range of choices available to an economy (Yakunina & Bychkov, 2015), and aiding improvements in long-run growth (Hanushek 2013). Human capital development stands as a significant driver of increased national productivity and economic growth and invariably leads to poverty reduction while promoting inclusive growth (Raheem et al., 2016).

Today, several countries of the world have seen the need to tap into the wealth of human capital, yet, the same cannot say of Nigeria which continues to wallow in poverty despite her huge human capital outlay. Even the once considered under-developed and developing nations have seen substantial economic transformations that have lifted their economies to the league of developed nations (Bhattacharjee & Haldar, 2015; Hanushek & Woessmann, 2016). A typical example is the Asian tigers whose economies experienced sharp improvements through substantial investments in human capital and its

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development. In what is today regarded as the "Miracle of East Asia", the unprecedented rise of a nation like Japan as a major world economic force, the development of nations such as South Korea, Taiwan, Singapore and Hong-Kong into rich nations and major exporters for a very long time and the more recent equally remarkable performance of the economies of nations such as Indonesia, Malaysia and Thailand, entirely lends credence to the importance of human capital and its development to the advancement of nations (World Bank, 2014). The remarkable growth of these nations was a function of the abilities of their economies to effectively utilize their growing population through effective development and conversion into meaning human economic resources (World Bank, 2014; Hanushek & Woessmann, 2016).

Interestingly, most of these Asian nations were once like Nigeria or even worse, but the same cannot be said today as shown by the huge gap between the economy of these nations and the Nigerian economy (World Bank, 2014). While these nations continue to invest heavily in the development and training of her human resources as shown by substantial budgetary allocations to education and health, Nigeria continues to play politics with her human capital development policy which has only been effective on paper. For instance, in 2012, the education sector only gets a budget share of 8.4%, and the health sector only gets around 6%. Whereas in the 2016 budget, the education sector's portion of the budget fell to only 6.07%, while the health sector only received around 3.64%. This data is showing a decline in allocations to these very important sectors which is no surprise why Nigeria, despite her huge human capital outlay and potentials, ranked a lowly 152 in the 2016 global HDI ranking by the United Nations with a HDI coefficient of 0.527 among 188 countries, behind nations such as Mauritius, Tunisia, Kenya, and above countries such as Niger, Sao Tome etc. (UNDP, 2016).

Available data from Nigeria's Central Bank further shows that enrolments in secondary and tertiary education have consistently grown over the years, from 27.08% and 3.54% in 1986 to 41.74% and 10.41% in 2015. The argument then would be, since enrolment has grown despite the poor investments in education and health, how has it reflected on the growth of the economy? Has the seeming growth in enrolment improved the economy? How has the economy fared in light of the declining investments in health? This paper, therefore, reflects on the impact of human capital development in Nigeria, especially as it relates to the government's investments in education and health, on macroeconomic performance in Nigeria. The findings would serve as a credible scorecard for policymakers in Nigeria as regards the effectiveness of fiscal policies relating to human capital. Additionally, this study would enhance existing knowledge of the various measurement issues associated with macroeconomic performance and human capital, and serve as a reliable guide in identifying the ones that are potent and/or the less efficient ones.

Previous studies such as the works of Oluwatobi & Oluranti (2011), Johnson (2011), Adawo (2011), Isola & Alani (2012), Kanayo (2013), Eigbiremolen & Anaduaka (2014), Omolara & Timothy (2014), and Jaiyeoba (2015) have carried out studies on the relationship between human capital development and economic growth relative to Nigeria. While authors such as Hanushek (2013), Mohsen & Maysan (2013), and Romele (2013) have carried out

such studies as it relates to developing countries. Human capital development and economic growth continue to be of substantial theoretical and empirical interest in both developed and developing countries.

Johnson (2011), Eigbiremolen & Anaduaka (2014), and Ali et al., (2016) found a strong positive relationship between human capital development and economic growth. Oluwatobi & Oluranti (2011), Jaiyeoba (2015), and Idenyi et al., (2016) showed that a positive relationship exists between recurrent government expenditure on human capital development and the level of real output, while capital expenditure is negatively related to the level of real output. Isola & Alani (2012) showed that both education and health components of human capital development are critical to economic growth in Nigeria. Kanayo (2013) showed that investment in human capital in the form of education and capacity building at the primary and secondary levels impact significantly on economic growth, while capital expenditure on education was insignificant to the growth process.

This paper deviates from existing literature in the sense that while human capital development measures have tested on real GDP. The authors argue that substantial growth in GDP is not necessarily a reflection of a better standard of living for the citizens, as such, growth in per capita GDP is used to measure macroeconomic performance. Also, while these other studies employed estimation methods such as error correction mechanism, Johannsen cointegration and Engle-Granger cointegration tests in ascertaining possible short and long-run relationships between human capital development and economic growth, the authors find several shortcomings in these methods and employs the autoregressive distributed lag model (ARDL) introduced by Pesaran et al., (2001).

This paper is structured thus: section one has introduced the study, section two reviews previous literature, section three presents the data sources and trend analysis, section four focuses on the theoretical framework and model specification, section five presents and discusses the results, and section six concludes the study.

Methods

The data used in the study covers annual time series data for gross domestic product per capita, government education and health expenditures, and secondary and tertiary schools' enrolment rate from 1986 to 2015 obtained from Central Bank of Nigeria (CBN) Statistical Bulletin (2015) and World Bank, World Development Indicators (WDI, 2015). Human capital development is proxied by government expenditure on education, government expenditure on health, secondary enrolment rate, and tertiary enrolment rate. Macroeconomic performance defines the gross domestic product per capita.

The study adopts the endogenous growth model, following the work of the endogenous growth model adopted by Mankiw et al. (1992). The augmented Solow model as specified by Mankiw et al., (1992) can be used to set up a linear regression of the impact of human capital i.e., the effect of education and health on the macroeconomic performance. The model employed in an attempt to determine the impact of investments in education and health on macroeconomic performance in Nigeria.

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$$GDPPC = f(GEOH, GEOE, GFCF, SER, TER) \quad (1)$$

$$GDPPC = \beta o + \beta_1 GEOE + \beta_2 GEOH + \beta_3 GFCF + \beta_4 TER + \beta_5 SER + \mu_t \quad (2)$$

Based on the assumption of linearity of the variables, we take Log of both sides. Therefore, the model will be:

$$LogGDPPC = \beta_0 + \beta 1 LogGEOH + \beta 2 LogGEOE + \beta_3 TER + \beta_4 SER + \mu_t \quad (3)$$

Where; LogGDPPC = Log of GDP per capita, LogGEOH = Log of Government expenditure on, health, LogGEOE = Log of Government expenditure on education, SER = Secondary School enrolment rate, TER = Tertiary education enrolment rate, B_0 = intercept, β_1, β_2, β_3, and β_4 = slope of the linear equation, μ= error term; denotes other variables that are not specified in the model

The above model is consistent with the works of Johnson (2011), and Jaiyeoba (2015). However, this study seeks to contribute to knowledge in terms of method of analysis, autoregressive distributed lag model (ARDL).

The Autoregressive Distributed Lagged Model (ARDL) technique is employed in this study to ascertain the impact of human capital development on the macroeconomic performance of Nigeria, and therefore examine the relationship between the dependent variable - per capita GDP (GDPPC) and the explanatory variables of GEOE, GOEH, SER, and TER. The ARDL model, first introduced by Perasan & Shin (1999) and later extended by Perasan, Shin & Smith (2001), is based on the estimation of the an unrestricted error correction model that has several advantages over the conventional cointegration techniques, in that it allows for ascertaining cointegration between variables that are both I(0) and I(1).

Results and Discussion

Table 1 shows evidence of significant variation in the trends of the variables within the period of consideration. This evidence shows the differences between the maximum and the minimum of all the variables. The measure of dispersion or spread that is, the standard deviation of the government expenditure on education series exceeds that of government expenditure on health, while the standard deviation of secondary school enrolment rate also exceeded that of tertiary school enrolment rate. The data for all the variables are positively skewed.

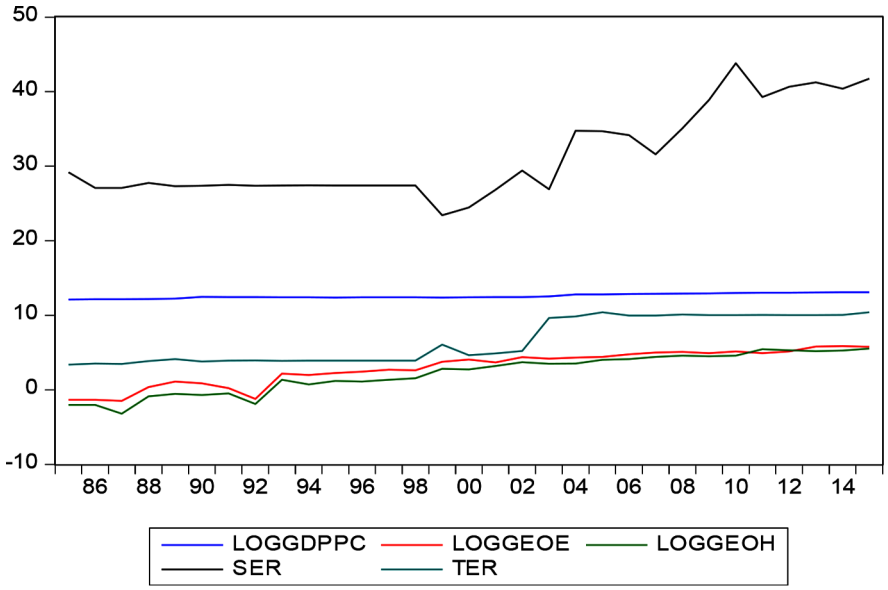
However, as shown in Table 1, he distribution of government expenditure on education has the most extended tail, which indicates that it has more extreme large values than others. The kurtosis of the distributions of GEOE and GEOH is greater than 3, an indication that they are both leptokurtic, while the kurtosis of the distributions of GDPPC, SER and TER are all less than 3, which indicates that they are all platykurtic. The probability of the Jarque-Bera statistics for both GEOE and GEOH are very low and leads to rejection of the null hypothesis of a normal distribution while the probability of the Jarque-Bera statistics for GDPPC, SER, and TER are insignificant, and leads to the acceptance of the null hypothesis of a normal distribution.

Table 1. The Result of the Descriptive Statistics

Stats	GDPPC	GEOE	GEOH	SER	TER
Mean	314410.7	85.99867	57.95233	31.44733	6.717333
Median	255343.9	50.78500	20.58000	27.46000	5.040000
Maximum	491663.9	348.4000	257.7200	43.82000	10.41000
Minimum	186573.1	0.230000	0.040000	23.41000	3.480000
Std. Dev.	101828.8	103.1886	77.85188	6.026434	2.998719
Skewness	0.527936	1.359860	1.343057	0.724557	0.204092
Kurtosis	1.744169	3.977478	3.514771	2.051045	1.118312
Jarque-Bera	3.364969	10.44042	9.350246	3.750558	4.634206
Probability	0.185912	0.005406	0.009324	0.153312	0.098559
Sum	9432322.	2579.960	1738.570	943.4200	201.5200
Sum Sq. Dev.	3.01E+11	308788.9	175766.5	1053.219	260.7772

Source: Data processing

Figure 1. Trend Analysis



Source: Data processing

Figure 1 shows a generally positive trend in all variables overtime except for GEOE and GEOH, which recorded negative trends between 1985 and 1995. GDPPC maintained a steady but almost insignificant growth rate, as shown in the figure above. There was also a dip in growth for TER between 2000 and 2005, and between 1997 and 2011 for SER. However, GDPPC maintained trends upward and had no dips whatsoever. In all, both the dependent and independent variables moved in the same direction, showing a positive relationship.

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Table 2 - Result of Unit Root Tests using Augmented Dickey Fuller (ADF)

Variables	ADF Lag	5% Critical Value	ADF Test Stat	Order of integration
LOGGDPPPC	0	-2.9718	-4.9682	I(I)
LOGGEOE	0	-2.9718	-6.8578	I(I)
LOGGEOH	0	-2.9677	-9.7540	I(I)
SER	0	-2.9677	-6.2338	I(I)
TER	0	-2.9677	-5.6930	I(I)

*significant at 5 percent level (Regression results include an intercept but not a trend)
Source: Data processing

Standard econometric methodologies usually assume stationarity in time series while they are in the real sense non-stationary (Oziengbe, 2013). Hence the usual statistical tests are likely to be wrong, and the inferences drawn from such results are likely to be erroneous and ambiguous (Dauda, 2010). The essence of testing for unit root is, therefore, to avoid spurious results. This condition because, if the series is by any means not stationary, then all the results from the classical linear regression analysis are not valid. The result of the Augmented Dickey-Fuller (ADF), unit root tests for the variables, presents in Table 2.

The results of the unit root test for variables presented in Table 2 reveals that the data series for the variables were non-stationary in levels, as the absolute values of the ADF test statistics were less than the absolute of the 95% critical value for the ADF statistic. However, this is not unexpected as most time series data are non-stationary in levels (Oziengbe, 2013). However, upon first differencing, all the variables became stationary, as the absolute values of the ADF test statistics were more than the absolute 95% critical value for the ADF statistic.

Table 3. Cointegration Test

Level of Significance	Critical Values		Wald Test (F-Value)
	Lower bound	Upper bound	
10%	2.45	3.52	4.215
5%	2.86	4.01	
2.5%	3.25	4.49	
1%	3.74	5.06	

Source: Data processing

We find that all our variables are stationary and integrated of order 1(1), thus eliminating the possibility of spurious results. The autoregressive distributed lag model is using to estimate the short and long run relationship between human capital development and macroeconomic performance.

The results of the bounds testing approach in Table 3 produces a calculated F-statistic of 4.215. This result is more significant than both the lower (2.86) and upper (4.01) critical value bounds at 5% level of significance — this result indicating that there is a co-integrating relationship among the variables.

Table 4. Long-run Coefficients, dependent variable is LOGGDPPC

Variables	Coefficient	Prob.
LOGGEOE	0.027496	0.7519
LOGGEOH	-0.012065	0.8867
SER	0.017046	0.0591
TER	0.066554	0.0148
C	11.626936	0.0000
R-Squared = 0.9761 Adjusted R-Squared = 0.9696 F-stat. F (5, 30) = 150.2995[0.000]		

Source: Data processing

The coefficient of the error correction model was as expected, negatively signed, and statistically different from zero, even at the 0.5% level. Thus, it will rightly act to restore equilibrium within the system should there be any deviation from it in the short run. Its coefficient (measuring the speed of adjustment to equilibrium in the event of displacement from it) indicates that it is about 44%. The estimated coefficient indicates that about 44 percent of this disequilibrium is corrected between 1 year to maintain long-run equilibrium.

In the long run, TER has a positive and significant relationship with GDP per capita, although GDP per capita is TER inelastic (See Table 4). It implies that although TER has a significant impact on GDP per capita, that impact is not strong enough. GDP per capita would respond slowly to changes in TER. Also, SER and GEOE have a positive but insignificant impact on GDP per capita, while GEOH has a negative and insignificant impact on GDP per capita. However, GDP per capita is GEOH elastic despite been insignificant. This condition to show that only a healthy population can have an impact on output growth.

The long-run co-integrating equation is given as follow:

Cointeq= LOGGDPPC - 0.0274*LOGGEOE - 0.0120*LOGGEOH + 0.0170*SER
+ 0.0665*TER + 11.6269.

Table 5. Error Correction Model Result

Variables	Coefficient	Prob.
D(LOGGEOE)	0.012075	0.7413
D(LOGGEOH)	-0.005298	0.8842
D(SER)	0.007486	0.1088
D(TER)	0.006548	0.5843
CointEq(-1)	-0.439152	0.0014

Source: Data processing.

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Furthermore, all the coefficients of human capital development are statistically insignificant, while government expenditure on health and tertiary enrolment rate had a negative relationship with GDP per capita in the short-run (See Table 5). However, in the short run, GDP per capita is GEOE, GEOH, SER, and TER elastic, although they are insignificant. This condition happens because their coefficients are less than 0.05.

The summary statistics reveals that the model has a perfect fit; it shows with the coefficient of determination (R^2) indicates that over 97.6%. The F-statistic of 150.29 is highly significant as it passes the test of statistical significance at the 0.5% level, indicating that the variables jointly explain the dependent variable (GDPPC), more so, significantly.

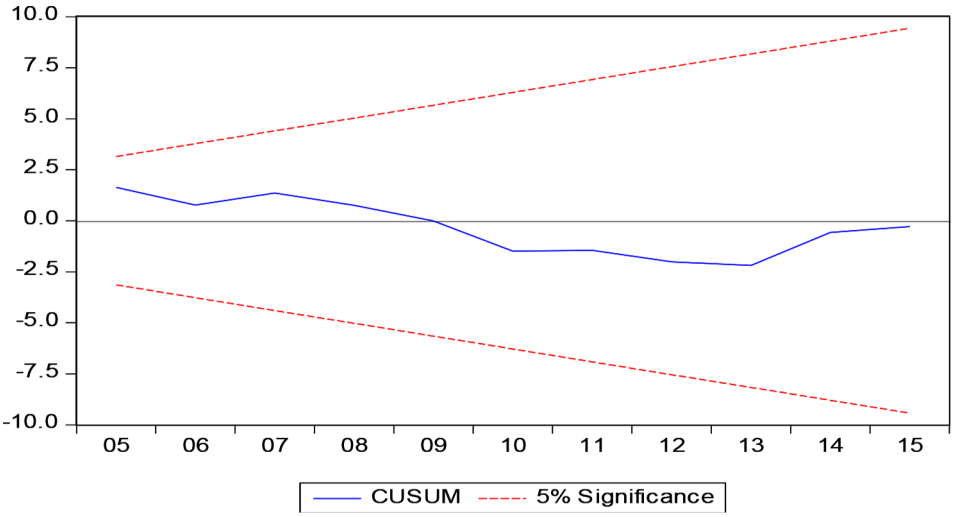
These findings are consistent with the works of Adamu (2003), Musibau & Rasak (2005), Dauda (2010), Jaiyeoba (2015), and Ali et al., (2016). They found a significant positive long-run relationship between human capital development and economic growth using Johannsen cointegration technique and error correction methodology. The findings are also consistent with the work of Kanayo (2013), who found that capital expenditure on education was insignificant to the growth process.

However, the findings of this work are inconsistent with the work of Idenyi et al., (2016) who found a significant long-run relationship between human capital development and economic growth in Nigeria. Furthermore, the findings of this work negate the work of Johnson (2011) who found a strong positive relationship between human capital development and economic growth, in that, this study found a weak relationship between components of human capital development and macroeconomic performance.

The findings have also shown that policymakers in Nigeria have not given due attention to the endogenous growth theory, which emphasizes the contribution of human capital investment in achieving economic growth. Endogenous growth models, pioneered by Romer (1990) have generally shown that the accumulation of human capital if properly managed, is an essential source of long-term growth. This fact has not been the case with Nigeria. Romer suggests that this accumulation in human capital is vital and could serve as an input into research and education, while Lucas (1988) posits that these accumulations in human capital offer several positive externalities such as spillover effects of a knowledge-based economy that will lead to economic growth. Human capital is allowed to improve the productivity of the recipients of such capital as well as the general economy.

The stability of the (parameters of the) model investigates with the plot of the cumulative sum of recursive residuals (CUSUM). The plot of CUSUM in Figure 2 lies between the straight lines, which is an indication that the model is stable. These diagnostic tests confirm the validity of the model, and as such, the model can, therefore, be relied upon for analysis and policy formulation by relevant government authorities and state planners. The policy implications discussed in the next section.

Figure 2. CUSUM Test



Source: Data processing

Conclusion

This paper examined the extent to which the human capital development indicators of the government's education and health expenditures affect the macroeconomic performance of Nigeria. The results showed that human capital development has a negative and insignificant impact on macroeconomic performance in the short run while only TER has a positive and significant impact on GDP per capita, albeit, a slow impact. The study concludes that human capital development has not been an efficient determinant of the rate of growth in the macroeconomic performance of Nigeria. This study is suggestive of the fact that government's effort at improving education and health through spending is inadequate and confirms the nation's continued decline in both the amount and quality of education at all levels of Nigeria, as well as the deteriorating health status of the citizenry. The human capital of an economy is more productive if educated and healthy than not.

The findings suggest that unless the policy thrusts of the government geared towards improving the human capital base of the country accelerated the performance of the economy would not be achieved and culminate in the realization of its macroeconomic objective of the overall improved wellbeing of her citizens. Moreover, while increasing spending is good, higher budgetary allocation to human capital development is not just what is needed. Effective utilization of disbursed funds meant for capital projects in the education and health sectors should be closely monitored to ensure maximum delivery. Also, greater emphasis should place on increasing the stock of capital expenditure over recurrent expenditure in the education and health sectors.

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