



Impact of Human Capital Development on Per Capita Income in Nigeria

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Abstract

This study used time-series data from 1986 to 2025, sourced from the Central Bank of Nigeria Statistical Bulletin, the National Bureau of Statistics Bulletin, and the United Nations Development Program Report, to examine the impact of human capital development on per capita income. The study adopted E-Views for statistical analysis and used the Augmented Dickey-Fuller unit root test to assess the stationarity of the series. The bounds testing approach to cointegration was used to establish the long-run relationship between the variables, while the Error Correction Mechanism was used to determine the speed of adjustment to long-run equilibrium. Economic growth was proxy by per capita income (PCI); human capital development was proxy by government capital expenditure on education (GCXE), on health (GCXH), and on research and development (GCXRD). The study indicated that government capital expenditure on health and education was statistically significant in both the short and long run, while research and development was statistically insignificant in both periods. It was concluded that human capital development has a positive impact on economic development in both the short and long run, and that there is a long-run relationship between human capital development and economic performance. The study recommended, among others, that the government increase budgetary allocations to education, health, and research and development.

Keywords: Human, Capital, Development, Income, Economies

Introduction

The development of human capital is recognized by policymakers, stakeholders and economists as a prerequisite for socio-economic transformation. Among the generally agreed causal factors responsible for the impressive performance of the economies of the emerging and newly industrialized countries is the commitment to human capital formation for knowledge, skills and innovation through appropriate expenditure on education, health, research and development (Entekhabi, 2023; Aluko & Aluko, 2012; Adelakun, 2011). Economies that have invested in human capital development have achieved tremendous progress in socio-economic development, leading to robust and sustainable human development over time (Eniekezimene, Wodu & Anda-Owei, 2023; World Bank, 2021).

The World Bank has categorically encouraged critical investment in human capital as crucial for African development, so as to unlock its potential and resolve the lingering poverty crises in the region (World Bank, 2025). However, Nigeria and many other African countries have yet to reach their maximum capacity in terms of human capital development and, as such, are bedeviled with numerous challenges, ranging from low quality of educational delivery, poor infrastructure in healthcare and a lack of innovation, which have resulted in low per capita income and low life expectancy (Daasi, 2023;). A large percentage of Nigeria's population, estimated to be over 250 million, remains at rather low levels of literacy and often has insufficient access to education and healthcare and, as such, becomes less productive and lives in perpetual poverty (Ikpot, 2022).

Nigeria, a giant of Africa, is expected to be a hub for human capital development but faces critical obstacles to achieving sustainable human capital growth (Euphemia, 2022; Akunede, Nzeribe & Ezenekwe, 2022). Moreover, improving the quality of the workforce yields implicit, non-economic outputs, such as the generation of new ideas and better decision-making, which have a significant positive impact on investment, innovation and other growth

opportunities (Adebiyi, 2006; Ragan & Lipsey, 2005 Roux, 1994). The wealth of a nation is critically determined by its level of human capital, as differences in socio-economic development across the globe are determined not only by natural resource endowments and the stock of physical capital but also by the quality and quantity of human resources (United Nations Development Program, 2025, 2024b; Harbison, 1971). Omodero (2019) opined that investment in education, health and research and development can enhance job creation and improve income. Moreover, investment in education yields long-term dividends, empowers individuals with relevant skills and adequate knowledge, and supports impactful decision-making, which enhances the efficient use of resources and productivity for poverty alleviation (Anyanwu, Adam, Obi, Yelwa, 2015).

In the same vein, a more educated and informed workforce can instigate economic growth through ground-breaking innovation capable of making the economy globally competitive and more productive (Odigwe & Owan, 2019). However, the Nigerian education system is bedeviled by severe underfunding, causing unnecessary industrial disharmony, as budgetary allocation remains one of the lowest in Sub-Saharan Africa and perpetually below 10%, which is not up to the 15%-20% benchmark recommended by the United Nations Educational, Scientific, and Cultural Organization (Business Day, 2025; Odigwe & Owan, 2019). This is evident in the disparity between Nigerian graduates and the modern industry, where there is a total lack of requisite skills, leading to a high rate of unemployment. Some analysts argue that the magnitude and trend of the recent increase in allocation to the critical sectors of the economy might be misleading in passing judgment on budgetary performance until the percentage allocations or the increase in percentage allocation is considered (Ndubuisi, 2024; Aigbokhan, Imahe & Ailemen, 2017).

Furthermore, a healthy workforce is paramount to the growth of human capital, as healthy individuals are more productive and efficient. Investments in healthcare infrastructure enhance overall workforce output, contribute significantly to economic progress, reduce healthcare costs and freeing resources for other exigencies (Egbaseimokumo, 2025). Like education, the health sector faces similar challenges leading to brain drain. The primary healthcare system is chronically underfunded; there is an acute shortage of qualified medical personnel, and the doctor-to-patient ratio remains one of the most worrisome situations across the globe (World Health Organization, 2023). In Nigeria, the ratio of doctors to patients is about 1 to 3500, which is far below world health organization recommendations of 1 doctor to 1000 and is dismal when compared to countries like Brazil, where it is 1 to 356, and India, where the ratio is 1 to 811 (India Data Map, 2019). The severe shortage of professional medical personnel in Nigeria is responsible for high maternal mortality and low life expectancy (World Health Organization, 2023).

In addition, government expenditure on research and development, in the form of innovation, technology transfer, and finding new and better ways to perform tasks faster, can boost per capita income (Coe et al., 2009). Developing new products and fostering technological adoption and innovation not only lead to better and more dependable solutions to societal problems but also make the entire economy competitive in the global arena. Research and development bring about innovation, through which new information is generated and applied to economic processes for long-term progress (Smith et al., 2012). Industrial innovation, particularly functional enhancements in processes, systems, services, and products is essential for both competitiveness and overall economic growth (Smith and Estivals, 2011). The Nigerian government has made several attempts to boost research and development through the establishment of the National Space Research and Development Agency (NASRDA) in 1998, which marked a significant milestone in the country's research and development efforts, with allocations dating back to 2010.

However, Nigeria's research and development expenditure remains relatively low at around 0.02% of gross domestic product, which is below the African average of 0.5% and far below the global leaders, who invest 3-4% of gross domestic product. Interestingly, South Africa grew its gross expenditure on research and development to \$2.353 billion in the period between 2017 and 2018 (Olaleye, et al, 2026). The effects of improved health care delivery, provision of quality education, and adequate provision for research and development are often manifested in a healthy, skilled workforce with cutting-edge innovative ability that significantly enhances per capita income, health status, and welfare (United Nations Development Program, 2025). Nigeria remains one of the poorest nations in the world, where per capita income is below a dollar per day (World Bank, 2025; World Health Organization, 2023). The report published by Sudanese American Physician Association, (2025) indicated that Nigeria, has 70.7% of its population living in extreme poverty which was only better than Somalia and South Sudan among the top ten (10) countries in the world with the largest number of people living in extreme poverty. More so, life expectancy for an average Nigerian has

improved from 52 years in 2023 to 54 years in 2025, but it remains worrisome, as Nigeria, termed the richest in Africa, trailed behind war-ravaged country like Sudan, where life expectancy stands at 66.5 years, and South Sudan, with 57.7 years of life expectancy (United Nations Development Program, 2024b).

Furthermore, the government has indicated commitment to improving human capital development, aiming to rank among the top 80 countries on the global human capital index (HCI) by 2030 (Egbaseimokumo, 2025). To achieve this, the country has introduced human capital development (HCD) 2.0 and secured a series of World Bank loans focused on integration and measurable impact. In 2024 and 2025, the World Bank approved \$1.57 billion and \$1.08 billion, respectively, for Nigeria to finance projects in education, healthcare, innovation, and climate resilience, supporting the growth of human capital development and enhancing the equitable distribution of income (World Bank, 2025). Despite abundant resources and annual allocations to education and health, Nigeria has failed to attain full development potential in sustainable human capital development, as evidenced by low labor efficiency, poor factor immobility, limited occupational specialization, a deficient supply of entrepreneurs, a lack of requisite skills among the youth, high level of unemployment and underemployment, poor economic output, low per capita income, a persistent cycle of poverty and low life expectancy among others. Interestingly, this research is motivated by the fact that previous studies on the significance of human capital development for economic development are divergent, with no point of agreement, and none considered government capital expenditure on research and development as worthy of inclusion in their respective studies. The questions this study seeks to answer are: what is the impact of human capital development on per capita income in Nigeria? Does a long-run relationship exist between human capital development and per capita income? The specific objectives of the study are

- i. To examine the impact of human capital development on per capita income in Nigeria
- ii. To evaluate the long-run relationship between human capital development and per capita income in Nigeria

The following hypotheses were formulated in Null form in accordance with the above objectives:

- i. H_{01} : human capital development does not have impact on per capita income in Nigeria
- ii. H_{02} : there is no long-run relationship between human capital development and per capita income in Nigeria

Human capital, as a concept, can be traced to the classical school of thought in 1776 and, as a scientific theory, to Fitzsimons (1999). Schultz (1961) recognized human capital as one of the important factors determining economic growth. Todaro and Smith (2009) viewed human capital as productive investment undertaken to improve an individual's ability to enhance productivity. Such investment could be in health care, education, research and development, and skills acquisition to enhance abilities and ideas. Rastogi (2002) conceptualized human capital as "knowledge, competency, attitude and behavior embedded in an individual". Rosen (1999) stated that human capital is 'an investment that people make in themselves to increase their productivity'. Furthermore, the concept of human capital has also been defined as 'an amalgam of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness and initiative that enhance the value of a worker's marginal product' to increase the entire output (Frank & Bemanke, 2007).

Human capital development has been described as a means of realizing people's potential by enhancing their capabilities for empowerment and enabling them to participate actively in their own development. It can also be understood as the acquired and useful abilities of all the inhabitants or members of society. Amassoma and Nwosa (2018) asserted that human capital development consists of conscious efforts to amplify human knowledge, improve skills and productivity, and inspire the resourcefulness of individuals. United Nation Development Program (2022) defined human capital development as the process of expanding people's choices by expanding human functioning and capabilities, which can lead to an increase in income. According to Kenton (2025), per capita income is a measure of the average income earned per person in a specific geographical area, calculated by dividing the total income by the population. It is a metric used to assess the standard of living and the quality of life of the population. According to Hall (2024), per capita income equals the total gross domestic product divided by the population. It is a measure of the economic status of a nation's residents and a key parameter used to measure average income and the standard of living in a country. Changes in per capita income are used to reflect the state of people's welfare. In addition, Rahman (2013) stated that the per capita income of a country is negatively associated with the level of unemployment in that

country. In other words, an increase in per capita income means a reduction in the rate of unemployment. However, the major criticism of per capita income as a measure of standard of living is that it has not solved the problem of income disparity or enhanced the fair distribution of income, as there is abject poverty in the face of increasing gross domestic product in a nation like Nigeria (Ebhosha, 2025). Studies have shown that there is a direct relationship between human capital development and per capita income, as increased capital expenditure on education and health leads to generation of employment opportunities, which in turns bring about growth in gross domestic product (United Nations Development Program, 2024a).

A series of theories have established relationship between human capital development and economic growth; modernization theory is one of the theories that explain how human capital can be developed to ensure an increase in economic output. According to Rostow (1960) and Parsons (1971), modernization theory concentrates on how education transforms and modifies an individual's values, beliefs and behavior through exposure to modernization institutions such as schools, factories and mass media, among others. Once a critical segment of a population changes in this way the pace of society's modernization and economic growth quickens. Educational expansion, through its effects on individual values and benefits, sets in motion the necessary building blocks for a more productive workforce and more sustained economic growth. Also, endogenous growth theory is another growth model that has attempted to establish a positive relationship between economic growth and human capital. The theory has been widely discussed as another area in economics linking economic growth to human capital. Paul Romer and Robert Lucas are credited with popularizing the endogenous growth theory model in the 1980s; their work identified a number of factors that determine the growth rate of an economy, including innovation, openness to trade, international research and development and human capital formation. (Lucas, 1988; Romer, 1986, 1990)

This study based its theoretical framework on endogenous growth theory, which holds that the growth rate of an economy's output is determined endogenously within the economic environment. It examined the role of endogenous factors, such as government policies, political stability and human capital, in significantly stimulating economic growth. The theory recognizes human capital as the driving force in the economy's growth process. The endogenous model is, as a result, a response to the shortcomings of the Solow growth model. However, Mankiw et al. (1992) proposed an augmented version of this model, in which the Cobb-Douglas production function is assumed, with human capital accumulation added to the Solow model. According to Mankiw, Romer and Weil (1992), the aggregate output of the economy can be stated as:

$$Y_t = K_t^\alpha H_t^\beta (A_t L_t)^{1-\alpha-\beta} \quad \alpha > 0, \beta > 0, \quad (1)$$

Where Y_t is the economy's output, A is the index of technical change that varies over time but is held constant for the time being, K denotes the capital stock, L shows the supply of labor, and H is the stock of human capital, while α and β denote the quantities of capital stock and human capital that can be produced over time.

Several empirical reviews have established relationship between human capital development and economic growth. Egbasimokumo (2025) examined the determinants of human capital development in Nigeria, adopting the Human Development Index (HDI) as the dependent variable and government expenditure on education (GEX), government expenditure on health (GHE), and training and skills development (TKD) as the independent variables. The study used an Error Correction Model (ECM) to analyze data from 1981 to 2023; the results revealed that government expenditure on education, government expenditure on health, and training and skills development were statistically significant, while the ECM results indicated a long-run relationship among the variables.

Orga et al. (2021) evaluated the potential of entrepreneurship development as a panacea for job creation and sustainable economic development in Nigeria. The results indicated that job creation was significantly and favorably affected by skill acquisition. In the same vein, Isola and Alani (2012) evaluated the contribution of different measures of human capital development to economic growth in Nigeria. It used data from Nigeria and adopted the growth account model, which specified the growth of gross domestic product as a function of labor and capital. Based on the estimated regression and a descriptive statistical analysis of trends in government commitment to human capital development, it was found that both the education and health components of human capital development are crucial to economic growth in Nigeria. Also, Jaiyeoba (2015) carried out an empirical investigation into the relationship between investment in education and health and economic growth in Nigeria, using time-series data from 1982 to

2011. The study used trend analysis, Johansen cointegration and the ordinary least squares technique. However, the empirical findings indicated a long-run relationship between government expenditure on education and health and economic growth. The variables: health and education expenditure, secondary and tertiary enrolment rates and gross fixed capital formation appeared with the expected positive signs and were statistically significant, with the exception of government expenditure on education and the primary enrolment rate. In stark disagreement with the above, Amassoma & Nwosa (2018) examined the causal nexus between human capital investment and economic growth in Nigeria for sustainable development in Africa at large between 1970 and 2009, using a Vector Error Correction (VEC) and pair wise Granger causality methodology. The results revealed no causality between human capital development and economic growth.

Materials and Methods

This study used time-series data from the Central Bank of Nigeria, CBN, (2025; 2024; 2023) statistical bulletin and the United Nations Development Program (United Nations Development Program, 2025) report. In addition, data were sourced from the Nigeria Gross Domestic per capita (2024). Human capital development was proxy by total government capital expenditure on education, total government capital expenditure on health, and total government capital expenditure on research and development. This is because education enables a large number of young people to access learning and skills acquisition, thereby enhancing productivity; health is equally important, as a healthy workforce supports the growth of human capital and output; and government capital expenditure on research and development is key, as it enhances innovation and technological transfer that aid economic development. The software package used for the regression analysis was E-Views 9. The pretest estimates included a unit root test using the Augmented Dickey-Fuller bound test approach, an error-correction model, and an ARDL model.

Model Specification

Adelakun, (2011) model was adopted to suit the objectives of the study. The original model was stated as follows:

$$GDP = F(TGVTEE, TGVTEH, TSE, SCSE, PRYSE, U) \quad (2)$$

Where: GDP is gross domestic product, TGVTEE is total government expenditure on education, TGVTEH is total government expenditure on health, TSE is tertiary school enrollment, SCSE is secondary school enrollment, and PRYSE is primary school enrollment. Modifying the above model (equation 2) in line with the main objective of the study, equation (3) was obtained and given as:

$$PCI = F(GCXE, GCXH, GCXRD, U) \dots\dots\dots 3$$

Where F is function, PCI is per capita income, $PCI = GDP_x / Population_x$, where x is the year, GCXE is total government capital expenditure on education, GCXH is total government capital expenditure on health, GCXRD is total government capital expenditure on research and development and U is the error term. Equation 3 is stated in econometric form to derive equation 4 as shown below:

$$PCI = \lambda_0 + \lambda_1 GCXE + \lambda_2 GCXH + \lambda_3 GCXRD + u \dots\dots\dots 4$$

Where λ_0 is the intercept, λ_1 , λ_2 and λ_3 are the coefficients of the explanatory variables, GCXE, GCXH and GCXRD respectively.

A priori expectation

In accordance with economic theory, an increase in government capital expenditure on education would lead to an increase in per capita income; an increase in government capital expenditure on health would lead to an increase in per capita income and an increase in government capital expenditure on research and development would equally bring about an increase in per capita income. Therefore, a positive relationship is expected between the variables as stated below:

$$\lambda_0 > 0, \lambda_1 > 0, \lambda_2 > 0, \lambda_3 > 0$$

Results**Table 1: Descriptive Statistics**

	PCI	GCXE	GCXH	GCXRD
Mean	162143.50	174.31	107.18	98.31
Median	120892.50	78.53	37.41	25.46
Maximum	465002.30	790.12	536.07	317.53
Minimum	1730.55	0.23	0.04	0.01
Std. Dev.	152771.30	213.06	140.90	83.24
Skewness	0.54	1.29	1.46	0.54
Kurtosis	1.86	3.79	4.39	1.34
Jarque-Bera	3.67	10.92	15.77	5.84
Probability	0.16	0.00	0.00	0.05

Source: Researcher's Computation, 2026

The table above shows the descriptive statistics of the variables. Only per capita income was normally distributed, with a higher probability of 0.16, while government capital expenditure on education GCXE, government capital expenditure on health (GCXH), and government capital expenditure on research and development (GCXRD) were not normally distributed.

Table 2: Unit Root Test

Variable	Augmented Dickey-Fuller (ADF) Unit Root test		
	Level	First Difference	Integration Order
LOG(PCI)	-3.7332 (0.0065)	-3.7597 (0.0508)	I(0)
LOG(GCXE)	-3.6736 (0.4551)	-3.6908 (0.0419)	I(1)
LOG(GCXH)	-3.7322 (0.2044)	-3.6904 (0.0017)	I(1)
GCXRD	-2.3781 (0.3768)	-3.8089 (0.0405)	I(1)

Source: Researcher's Computation, 2026.

Table 2 presents the unit root test results for the variables, indicating whether they are well behaved. Per capita income (PCI) was stationary at level I(0), while GCXE, GCXH and GCXRD were stationary at first difference I(1). Since the series have mixed orders of integration, a bounds test approach to cointegration was adopted to determine the long-run relationship between the variables. The results are shown in Table 3 below.

Table 3: Critical value bounds for F- and W-statistics

K	95% Level		90%		F(W) - Statistic
	Lower bound	Upper Bound	Lower bound	Upper	
3	2.27	3.28	1.99	2.94	14.17686

Source: Researcher's Computation, 2026.

In Table 3 above, the F(W) statistics are greater than the upper bound at both the 5% and 10% levels, indicating cointegration among the variables. In other words, there is a long-run relationship between the variables. The implication is that, all else equal, GCXE, GCXH and GCXRD have long-run relationships with per capita income, PCI.

Table 4. Short run ARDL results:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.87687	0.652113	2.878136	0.0073
LOG(PCI(-1))*	-0.166758	0.06722	-2.480768	0.0189
LOG(GCXE)**	0.184346	0.098112	1.878934	0.0568
LOG(GCXH)**	0.145298	0.078789	1.844140	0.0196
GCXRD **	0.029354	0.015612	0.188022	0.9049
ECM	-0.656758	0.018605	-8.963017	0.0000
Regression Statistics				
R-squared	0.874247			
Adjusted R-squared	0.744247			
Durbin-Watson stat	2.185275			

Source: Researcher's Computation, 2026.

The table above shows the short-run autoregressive distributed lag results for the variables. The results indicate that GCXE, with a coefficient of 0.184346, and GCXH, with a coefficient of 0.145298, are significant at the 10% level, with probabilities of 0.0568 and 0.0196, respectively. The results indicate a direct relationship between GCXPE, GCXH and PCI, which is in accordance with a priori expectation. The economic interpretation is that, in the short run, a percentage increase in GCXE and GCXH would lead to 18.4% and 14.5% increases in PCI. GCXRD, with a probability of 0.9049, was not significant, as the probability was high, but it showed a direct relationship with PCI, which conformed to a priori expectation. Also, the error-correction term, with a probability of 0.0000, is significant, while its coefficient of -0.656758 indicates that 65% of the error is corrected every year to return to equilibrium. In the same vein, the R-squared value of 0.874247 means that 87% of the variance in the dependent variable is explained by the model, which makes it a good fit. Only 13% is explained by the error term.

Table 5. Long-Run ARDL results:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GCXE)	0.505802	0.270514	1.869783	0.0124
LOG(GCXH)	0.871314	0.553833	1.573243	0.0531
GCXRD	0.176026	1.459200	0.120632	0.9048
C	11.25508	1.000943	11.24447	0.0000

Source: Researcher's computation, 2026.

The long-run ARDL result showed that GCXE, with a coefficient of 0.505802, was significant at the 5% level (probability 0.0124), while GCXH, with a coefficient of 0.871314, was also significant at the 10% level (probability 0.0531). Both GCXE and GCXH showed a direct relationship with PCI, which is consistent with economic theory. The economic interpretation is that a 1% increase in GCXE and GCXH in the long run would lead to increases of 50.5% and 87.1% in PCI, respectively. GCXRD was not significant, with a high probability of 0.9048, but it maintained a positive relationship with PCI, which is in conformity with economic theory.

Discussion

The short-run result for the coefficient of total government capital expenditure on education (GCXE) showed that it was statistically significant at the 10% level. This means a 1% increase in total government capital expenditure on education increases per capita income by 18.4% in the short run. The long-run coefficient also indicated that total government capital expenditure on education is statistically significant at 5%. This means that a 1% increase in total government capital expenditure on education would lead to a 50.6% increase in per capita income in the long run. The economic implication of this is that government capital expenditure on education, in terms of knowledge, skills,

values, morals and habits, among others, stimulates economic growth. Moreover, both the long-run and short-run results showed a positive or direct relationship between GCXE and PCI, which was consistent with a priori expectations, because the higher the GCXE, the greater the increase in PCI.

The coefficient of total government capital expenditure on health (GCXH) was statistically significant at 5% in the short run and at 10% in the long run, with probabilities of 0.0196 and 0.0531, respectively. The interpretation is that, ceteris paribus, a 1% increase in total government spending on health would lead to increases in per capita income of 14.5% and 87.1% in the short run and long run, respectively. This also indicates that total government capital spending on health stimulates economic growth in the year under review. The short-run and long-run results indicate a positive, direct relationship between GCXH and PCI, consistent with economic theory: the healthier an individual is, the more productive they become. The coefficients for total government capital expenditure on research and development (GCXRD) were not statistically significant in either the short run or the long run. This means that, every other thing remaining equal, GCXRD did not contribute to the increase in per capita income in the year under review.

Conclusion

The study examined the impact of human capital development on per capita income in Nigeria. It was found that both GCXE and GCXH had a positive impact on per capita income in the year under review. However, total government capital expenditure on research and development, GCXRD, had no impact on per capita income in the year under review. The conclusion drawn from the above study is that human capital development has an impact on economic development and that there exists a long-run relationship between them.

Recommendations

The following were recommended:

- Government should increase investment in capital expenditure in education through increase in budgetary allocation
- Government should increase investment in capital expenditure in the health sector through budgetary allocation
- Government should increase investment in capital expenditure in R&D through budgetary allocation
- As a matter of urgency, government should resolve the lingering crises in the education and health sectors so that investment in these sectors would yield positive results.

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