

Human Capital Development and Sustainable Economic Growth in Nigeria: Evidence from Sustainable Development Goal 8

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ABSTRACT

This study examined the effect of human capital development on sustainable economic growth in Nigeria within the context of Sustainable Development Goal 8. A quantitative ex-post facto research design was adopted using annual data obtained from the World Bank's World Development Indicators. Sustainable economic growth was proxied by GDP per capita growth, while human capital development was measured by government expenditure on education, secondary school enrolment, and tertiary school enrolment. Descriptive statistics, Pearson correlation, and separate Ordinary Least Squares regression models were estimated using the available overlapping observations for each indicator. The results showed that government expenditure on education had a positive but statistically insignificant effect on GDP per capita growth ($\beta = 20.666$, $p = 0.146$, $R^2 = 0.199$). Secondary school enrolment had a negative and statistically insignificant effect ($\beta = -0.132$, $p = 0.252$, $R^2 = 0.068$), while tertiary school enrolment had a positive and statistically significant effect ($\beta = 1.526$, $p = 0.044$, $R^2 = 0.679$). The findings indicated that the contribution of human capital development to sustainable economic growth varied across the educational indicators examined. The study concluded that tertiary school enrolment exhibited the strongest positive relationship with GDP per capita growth, whereas government expenditure on education and secondary school enrolment did not produce statistically significant effects. The study recommended improving the effectiveness of education expenditure, strengthening the quality of secondary education, and sustaining policies that support tertiary education participation in Nigeria.

Keywords: Human capital development, sustainable economic growth; education, SDG 8; Nigeria.

INTRODUCTION

Sustainable economic growth remains central to Nigeria's development agenda because improvements in output per person are closely linked to higher living standards, stronger productivity, and broader development outcomes. Within the context of Sustainable Development Goal 8 (SDG 8), sustained economic growth is particularly important because it reflects the capacity of an economy to expand productive activity while creating opportunities for improved welfare. In Nigeria, however, the relationship between economic growth and development outcomes has remained uneven, partly because growth has not always translated into sufficient improvements in employment, productivity, and human welfare (Babasanya et al., 2018; Afolayan et al., 2019). This has increased attention on human capital development as an important factor in strengthening long-term economic performance. Human capital development is especially relevant because education improves knowledge, skills, and productive capacity, which can enhance individual and national economic performance (Abdullahi et al., 2018; Chijioke & Amadi, 2019).

Education constitutes a major component of human capital development because it equips individuals with competencies that can improve labour productivity and participation in economic activities. In Nigeria, government expenditure on education, secondary school enrolment, and tertiary school enrolment represent important dimensions through which human capital is developed. Abanyam et al. (2020) emphasised the role of higher education in sustainable economic development, particularly through the production of skilled manpower. Similarly, Ayeni and Omobude (2018) examined the relationship between educational expenditure and economic growth and showed that public investment in education remained relevant to the country's growth process. Keji (2021) also demonstrated that human capital variables, including education-related indicators, were important in explaining Nigeria's economic performance.

Despite this theoretical and empirical relevance, findings on the relationship between human capital development and economic growth in Nigeria have remained mixed. Some studies reported positive effects, while others found weak, insignificant, or varying relationships depending on the indicator and estimation method employed. Abbah et al. (2020) found that the relationship between human capital and economic growth could be nonlinear, suggesting that the growth effect of human capital may vary across economic conditions. Enekezeimene et al. (2023) likewise reported differing effects across human capital indicators, while Ohwofasa and Obeh (2023) showed that education-related variables did not contribute uniformly to sustainable economic growth. These inconsistencies suggest that human capital development cannot be treated as a homogeneous factor and that its individual components may influence growth differently.

This variation in findings presents an important empirical problem. Although Nigeria has continued to invest in education and expand participation at different levels of schooling, the extent to which these efforts have contributed to growth in output per person remains uncertain. Much of the existing literature has concentrated on aggregate GDP, composite human capital measures, or models containing several macroeconomic variables. Consequently, less attention has been given to the separate effects of government expenditure on education, secondary school enrolment, and tertiary school enrolment on GDP per capita growth. This distinction is important because GDP per capita growth provides a more direct indication of changes in economic output relative to population, thereby offering a useful perspective for examining sustainable growth within the SDG 8 framework. The present study addressed this gap by examining the individual effects of selected education-based human capital indicators on sustainable economic growth in Nigeria. Rather than combining the indicators into a single measure, the study assessed government expenditure on education, secondary school enrolment, and tertiary school enrolment separately. This approach made it possible to identify whether the different dimensions of human capital development produced similar or contrasting growth outcomes. It also distinguished the study from previous research that focused mainly on aggregate economic growth or broader measures of human capital development (Olowookere et al., 2022; Awogbemi, 2023).

Against this background, the study examined the effect of human capital development on sustainable economic growth in Nigeria. Specifically, it assessed the effects of government expenditure on education, secondary school enrolment, and tertiary school enrolment on GDP per capita growth. The study was guided by the research question: What effect does human capital development have on sustainable economic growth in Nigeria? The null hypothesis was stated as follows: H_0 : Human capital development has no significant effect on sustainable economic growth in Nigeria.

LITERATURE REVIEW

CONCEPTUAL REVIEW

Human Capital Development and Sustainable Economic Growth

Human capital development represents the process through which the knowledge, skills, competencies and productive capabilities of individuals are improved to enhance their contribution to economic and social

development. It extends beyond formal education to the broader accumulation of capacities that improve labour productivity, employability, innovation and participation in productive activities. Within the Nigerian context, human capital development has increasingly been recognised as an important element of economic development because the productive capacity of the economy depends partly on the quality and utilisation of its human resources. Studies on Nigeria have consequently linked human capital development with economic growth, employment creation and broader development outcomes (Badamasi, 2022; Nwaogu & Ikenyiri, 2022; Raymond & Ekponaanuadum, 2021). The relevance of human capital to sustainable economic growth rests on the expectation that improvements in knowledge and skills enhance workers' productive capacity and increase the efficiency with which other economic resources are utilised. Human capital investment may therefore influence economic growth by improving labour quality, facilitating innovation and increasing the capacity of individuals to respond to changing production requirements. Emeghara et al. (2021) associated human capital investment with Nigeria's economic development, while Asombo et al. (2023) linked human capital development with both employment and economic growth. These perspectives suggest that the contribution of human capital to growth is not limited to educational attainment alone but also depends on whether acquired capabilities can be productively absorbed within the economy.

The relationship between human capital and sustainable development also has a broader welfare dimension. Human capital development can strengthen the ability of households to participate in productive economic activities and reduce vulnerability to poverty. Adekoya (2018) examined human capital development in relation to poverty alleviation in Nigeria, while Olopade et al. (2019) considered the relationship between human capital and poverty reduction across OPEC countries. Bhukuth et al. (2018) similarly situated human capital within a broader framework linking productive capabilities and poverty outcomes. These perspectives reinforce the view that the economic value of human capital extends beyond aggregate output to improvements in individuals' capacity to participate meaningfully in development.

In Nigeria, however, the contribution of human capital to sustainable growth is influenced by wider structural conditions. Alade et al. (2021) examined human capital development within the context of terrorism and economic growth, illustrating how insecurity can affect the development and productive utilisation of human capabilities. Matthew et al. (2018) similarly linked electricity consumption and human capital development with economic growth, indicating that the returns to human capital may depend on the availability of complementary infrastructure. Aderemi et al. (2021) further situated human capital development alongside energy consumption and crude oil exports within the sustainable development process. These relationships imply that the availability of educated individuals may not be sufficient where the broader economic environment restricts their productive engagement.

Government Expenditure on Education and Sustainable Economic Growth

Government expenditure on education constitutes an important component of human capital development because public spending provides resources for educational infrastructure, teaching personnel, learning materials and institutional development. Through these channels, government investment can influence the accessibility, quality and effectiveness of education and, ultimately, the productive capacity of the labour force. In the Nigerian setting, education expenditure has therefore remained an important policy instrument for developing human resources and supporting economic growth. Amauche (2020) examined government human capital development expenditure in relation to economic growth in Nigeria, highlighting the relevance of public investment to the human capital-growth relationship. Okerekeoti (2022) also focused specifically on government expenditure on education and economic growth, reflecting continuing interest in whether increased public educational spending translates into improved economic performance. More recently, Abbah et al. (2025) examined government spending on human capital development and economic growth while recognising that prevailing structural conditions can influence the effectiveness of such expenditure. These studies provide a conceptual basis for treating government education expenditure as an investment in the productive capacity of the population rather than merely as recurrent public spending. The effectiveness of educational expenditure, however, depends not only on the amount committed but also on how available resources are allocated and converted into educational outcomes. Increased expenditure may have limited

implications for economic growth where resources do not significantly improve the quality of teaching, educational infrastructure, skills acquisition or labour-market readiness. This distinction is important because expenditure represents an input into human capital formation, while sustainable growth depends ultimately on the productive outcomes generated from that investment. The relationship between public spending and development can also be weakened by wider fiscal and institutional constraints. Aderemi et al. (2020), for example, considered capital flight within the context of poverty and sustainable development in Nigeria, drawing attention to how resource leakages can constrain domestic development capacity.

Human capital spending should therefore be understood as part of a wider process of converting public resources into productive capabilities. Although education represents a major element of this process, complementary investment in other sectors can also influence economic performance. Olayemi et al. (2019), for example, examined health expenditure alongside agricultural expenditure and economic growth, reinforcing the broader proposition that productive human capacity depends on the interaction of different forms of development investment. Within the present study, however, attention is specifically directed towards government expenditure on education as an education-based measure of human capital development.

Secondary and Tertiary School Enrolment and Sustainable Economic Growth

School enrolment represents another important dimension of human capital development because it reflects the extent to which individuals participate in formal education and are exposed to opportunities for acquiring knowledge and productive skills. Secondary education occupies an important position between basic education and advanced training because it develops intermediate skills and prepares individuals for employment, vocational training or progression to tertiary education. Expansion in secondary enrolment can therefore increase the potential supply of educated labour, although the economic benefits may depend on educational quality and the availability of productive opportunities after schooling. The developmental relevance of education extends beyond enrolment itself. Akarowhe (2018) associated economics education with sustainable national development, emphasising the capacity of education to strengthen knowledge and productive decision-making. Ogunjemilua (2021) similarly considered social studies education within the broader context of sustainable development in Nigeria. These perspectives demonstrate that educational participation can contribute to development when learning equips individuals with relevant skills, knowledge and competencies rather than merely increasing the number of persons enrolled in educational institutions. Tertiary education represents a more advanced dimension of human capital formation because it develops specialised knowledge, professional capabilities and higher-level skills. It can contribute to sustainable growth by expanding the availability of skilled labour and strengthening the human resource base required for productivity and economic transformation. The development implications of advanced education are particularly important where economies require specialised skills to improve production, management, innovation and service delivery. The role of education in promoting broader inclusion was also highlighted by Oluwadamilola et al. (2018), who examined human capital development and inclusive growth within the context of achieving SDG 4 in Nigeria.

Educational participation also carries important implications for groups that face persistent socio-economic disadvantages. Yusuff (2021), for instance, considered the role of education in enhancing national progress and sustainable economic development among Al-Majiri children in Northern Nigeria. Ogwumike and Ozughalu (2018) documented dimensions of child poverty and deprivation in Nigeria, indirectly highlighting the development challenges associated with inadequate access to opportunities required for human capital formation. These studies demonstrate that expanding participation in education can have broader developmental relevance, particularly where educational opportunities enable disadvantaged groups to improve their future productive capacity. Nevertheless, increases in school enrolment do not automatically imply improvements in economic performance. The growth effect of enrolment depends on whether participation results in meaningful learning, relevant competencies and eventual productive employment. Consequently, the distinction between secondary and tertiary enrolment is important because both levels contribute to human capital formation in different ways. Secondary education provides a broader foundation of intermediate skills, while tertiary education generates more specialised capabilities. Examining these indicators

separately therefore provides greater insight into which dimensions of educational participation are more closely associated with sustainable economic growth.

Human Capital Development and the SDG 8 Context

The relationship between human capital development and sustainable economic growth is particularly relevant to the pursuit of SDG 8, which places emphasis on sustained economic performance and productive participation. Human capital contributes to this process by strengthening the capacity of individuals to participate in productive employment and economic activities. From this perspective, education expenditure and school enrolment represent mechanisms through which productive capacities can be developed and subsequently translated into improved economic outcomes. The achievement of sustainable economic growth, however, requires more than increasing the quantity of educational inputs. Growth becomes more sustainable when human capital investment translates into productive employment, improved capabilities and stronger participation in economic activity. Asombo et al. (2023) connected human capital development with employment and economic growth, thereby underscoring the link between education, productive participation and economic performance. Similarly, Aderemi et al. (2021) situated human capital within the broader sustainable development process, indicating that its contribution needs to be considered alongside the structure and productive capacity of the economy. The concept also has an inclusion dimension because growth that fails to create opportunities for broad participation may produce limited welfare improvements. Oluwadamilola et al. (2018) linked human capital development with inclusive growth, while Adekoya (2018) and Olopade et al. (2019) demonstrated the relevance of human capital to poverty-related outcomes. These perspectives suggest that developing human capabilities can support sustainable growth where education enables individuals to participate more productively in economic activities and benefit from the resulting economic opportunities.

THEORETICAL FRAMEWORK

This study is anchored on the Human Capital Theory, which explains economic growth through investments that improve the knowledge, skills, competence and productive capacity of individuals. The theory assumes that expenditure on education and participation in formal learning constitute investments capable of enhancing labour productivity and increasing individuals' contribution to economic activities. From this perspective, education is not merely a social service but an important productive investment that can strengthen the quality of labour and improve economic performance. The relevance of this theoretical position to the Nigerian economy has been reinforced by studies that associate human capital development with economic growth, employment and sustainable development (Abdullahi et al., 2018; Keji, 2021; Raymond & Ekponaanuadum, 2021). The theory is particularly relevant to this study because government expenditure on education, secondary school enrolment and tertiary school enrolment represent distinct channels through which human capital can be accumulated. Government expenditure on education provides resources for developing educational institutions and improving access to learning, while secondary and tertiary enrolment indicate participation in formal education and the accumulation of knowledge and skills. As educational participation increases, the productive capacity of individuals is expected to improve, thereby contributing to higher levels of economic output. Chijioke and Amadi (2019) argued that investment in human capital could serve as a catalyst for sustainable economic development, while Abanyam et al. (2020) emphasised the role of higher education in strengthening Nigeria's sustainable development prospects. Human Capital Theory further suggests that the growth effect of education may differ according to the level and effectiveness of investment. Increased expenditure may not automatically generate higher economic growth where educational resources fail to produce relevant skills or where the economy is unable to utilise available human capital productively. Similarly, expansion in school enrolment may yield different outcomes at secondary and tertiary levels because both stages contribute differently to skill formation.

This provides a useful theoretical basis for examining the three human capital indicators separately rather than assuming that they exert identical effects on economic growth. Within the context of SDG 8, the theory provides a suitable foundation for explaining how improvements in human capital can support sustained

growth in output per person. Human capital development can strengthen productivity, employability and participation in productive activities, thereby improving the capacity of the economy to generate sustainable growth. The theory therefore provides an appropriate framework for examining the relationship between government expenditure on education, secondary school enrolment, tertiary school enrolment and GDP per capita growth in Nigeria.

EMPIRICAL REVIEW

Several empirical studies have examined the relationship between human capital development and economic growth in Nigeria and related economies. However, the findings have remained mixed, particularly with respect to the effects of education expenditure, school enrolment, and the broader quality of human capital on economic performance.

Abbah et al. (2025) examined government spending on human capital development and economic growth in Nigeria, with emphasis on the interactive influence of insecurity. The study found that the contribution of human capital expenditure to economic growth depended partly on prevailing economic and structural conditions. The authors concluded that increased public spending on human capital may not generate the expected growth outcomes where structural constraints weaken the productive utilisation of such investments. Jemiluyi and Jeke (2024) investigated the role of human capital development in the urbanisation-economic growth nexus in Nigeria. The study established that education-based human capital influenced economic growth both directly and through its interaction with urbanisation. The findings suggested that the contribution of human capital to growth could be strengthened when educational development occurred alongside other productive and structural transformations within the economy.

Bekele et al. (2024) examined the linkage between human capital development and economic sustainability across Sub-Saharan African countries using an augmented mean group approach. The findings showed that the relationship between human capital and economic sustainability depended substantially on the quality and effectiveness of human capital accumulation. The study emphasised that merely expanding educational participation may not be sufficient to guarantee sustainable economic outcomes.

Ohwofasa and Obeh (2023) examined human capital education and sustainable economic growth in Nigeria using public expenditure on education, primary and secondary school enrolment, and adult literacy as human capital indicators. Using cointegration and error-correction techniques, the study found that the effects of the various educational indicators differed in direction and significance. The authors concluded that individual dimensions of human capital did not contribute uniformly to sustainable economic growth.

Eniekezimene et al. (2023) investigated human capital development and economic growth in Nigeria using government expenditure on education and different levels of school enrolment. The study employed time-series econometric techniques and found variations in the direction and statistical significance of the human capital indicators. The findings demonstrated that the growth implications of human capital depended on the particular educational indicator considered.

Asombo et al. (2023) examined human capital development, employment, and economic growth in Nigeria. The study established that human capital development was relevant to both employment generation and economic performance. The authors argued that investment in human capital could enhance productive participation and contribute to improved economic outcomes when the acquired skills were effectively utilised within the economy. Nwobia et al. (2023) examined government expenditure on healthcare, education, and economic growth in Nigeria using an autoregressive distributed lag model. The study found that government expenditure on human capital development had important implications for economic performance, with education expenditure contributing to the growth process. The authors therefore emphasised the importance of effective public investment in human capital development.

METHODOLOGY

This study adopted a quantitative ex-post facto research design using annual data for Nigeria obtained from the World Bank's World Development Indicators. Sustainable economic growth was proxied by GDP per capita growth, while human capital development was measured using government expenditure on education, secondary school enrolment, and tertiary school enrolment. The dataset was cleaned by excluding blank entries and treating unavailable observations as missing values without interpolation. Due to differences in data availability across the indicators, estimation was based on the overlapping observations between GDP per capita growth and each human capital development variable.

The functional relationship is expressed as $GDPG_t = f(HCD_t)$, while the econometric model is specified as: $GDPG_t = \beta_0 + \beta_1 HCD_t + \varepsilon_t$. Specifically, the models are: $GDPG_t = \beta_0 + \beta_1 GEE_t + \varepsilon_t$; $GDPG_t = \beta_0 + \beta_1 SSE_t + \varepsilon_t$; and $GDPG_t = \beta_0 + \beta_1 TSE_t + \varepsilon_t$, where GDPG represents GDP per capita growth, GEE denotes government expenditure on education, SSE represents secondary school enrolment, TSE denotes tertiary school enrolment, β_0 is the intercept, β_1 is the estimated coefficient, and ε_t is the error term. Descriptive statistics, correlation analysis, and ordinary least squares regression were employed, with statistical significance assessed at the 5% level using t-statistics, p-values, and R^2 .

RESULTS

Table 1: Descriptive Statistics

Variable	N	Mean	Std. Dev.	Minimum	Maximum
GDP per capita growth (%)	27	1.981	3.721	-8.342	12.210
Government expenditure on education (% GDP)	12	0.414	0.072	0.319	0.549
Secondary school enrolment (% gross)	21	37.572	8.104	22.832	52.797
Tertiary school enrolment (% gross)	6	8.943	1.572	5.802	10.097

Source: Author's Computation, 2026

Table 1 presented the descriptive statistics of the variables employed in the study. GDP per capita growth recorded a mean value of 1.981% and a standard deviation of 3.721%, indicating that Nigeria's economic growth had exhibited considerable fluctuations during the period under review. The relatively high standard deviation compared with the mean suggested that economic performance had been unstable across the observed years.

This variability was further reflected in the minimum and maximum GDP per capita growth rates of -8.342% and 12.210%, respectively, indicating that the economy had experienced periods of both substantial contraction and relatively strong expansion. Government expenditure on education averaged 0.414% of GDP, with a standard deviation of 0.072%, suggesting that the proportion of national output devoted to education had remained relatively stable within the available observations.

Secondary school enrolment recorded an average of 37.572% and a standard deviation of 8.104%, indicating notable variation in participation at the secondary education level over the study period. Tertiary school enrolment, on the other hand, had an average value of 8.943% with a standard deviation of 1.572%, showing comparatively lower participation in higher education and relatively moderate variation across the available years.

Table 2: Correlation Results

Relationship	N	Pearson r	p-value	Decision at 5%
GDPG and GEE	12	0.446	0.146	Not significant
GDPG and SSE	21	-0.262	0.252	Not significant
GDPG and TSE	6	0.824	0.044	Significant

Source: Author's Computation, 2026

Table 2 presented the correlation results between the human capital development indicators and sustainable economic growth in Nigeria. Government expenditure on education had a moderate positive correlation with GDP per capita growth ($r = 0.446$), suggesting that increases in government expenditure on education had tended to move in the same direction as economic growth. However, the relationship was not statistically significant at the 5% level ($p = 0.146$). This implied that the observed positive association was insufficient to establish a statistically reliable relationship between government education expenditure and GDP per capita growth during the period examined. Secondary school enrolment had exhibited a weak negative correlation with GDP per capita growth ($r = -0.262$). The corresponding p-value of 0.252 exceeded the 5% significance level, indicating that the relationship was statistically insignificant. The result suggested that changes in secondary school enrolment had not been systematically associated with changes in GDP per capita growth within the available observations. The negative association might also have reflected the fact that increased enrolment represented an investment in human capital whose economic benefits might not have materialised immediately within the same period. In contrast, tertiary school enrolment had demonstrated a strong positive correlation with GDP per capita growth ($r = 0.824$). The relationship was statistically significant at the 5% level ($p = 0.044$), indicating that higher tertiary enrolment had been significantly associated with higher GDP per capita growth over the available observations. This finding suggested that participation in tertiary education had been more closely associated with Nigeria's economic performance than the other human capital indicators examined. Nevertheless, the result was interpreted cautiously because the tertiary enrolment analysis had been based on only six observations.

Table 3: OLS Regression Results

Variable	N	Coefficient	Std. Error	t-statistic	p-value	R ²	Adjusted R ²
GEE	12	20.666	13.106	1.577	0.146	0.199	0.119
SSE	21	-0.132	0.112	-1.182	0.252	0.068	0.019
TSE	6	1.526	0.524	2.911	0.044	0.679	0.599

Source: Author's Computation, 2026

Table 3 presented the Ordinary Least Squares (OLS) regression results on the effect of human capital development indicators on sustainable economic growth in Nigeria. The results showed that government expenditure on education had recorded a positive coefficient of 20.666, indicating that increases in government expenditure on education had been associated with higher GDP per capita growth. Specifically, a one-percentage-point increase in government expenditure on education as a share of GDP had been associated with approximately a 20.666 percentage-point increase in GDP per capita growth, holding other factors outside the model constant. However, the estimated coefficient had not been statistically significant at the 5% level ($t = 1.577$; $p = 0.146$). Thus, although the direction of the relationship had conformed to the expectation that greater investment in education could enhance economic performance, the available evidence had not been

sufficient to establish a statistically significant effect. The R^2 value of 0.199 indicated that government expenditure on education had explained approximately 19.9% of the observed variation in GDP per capita growth, while the remaining 80.1% had been attributable to factors outside the model. The estimated equation was: $GDPG_t = -8.826 + 20.666GEE_t$

Secondary school enrolment had recorded a negative coefficient of -0.132. This indicated that a one-percentage-point increase in secondary school enrolment had been associated with approximately a 0.132 percentage-point reduction in GDP per capita growth during the period examined. However, the coefficient had not been statistically significant ($t = -1.182$; $p = 0.252$), implying that the observed negative relationship had not provided sufficient statistical evidence of an effect on sustainable economic growth. The result could also have reflected the possibility that increases in secondary school participation had represented human capital investment whose economic benefits had required time to materialise rather than producing an immediate effect on annual GDP per capita growth. Furthermore, the R^2 of 0.068 showed that secondary school enrolment had explained only 6.8% of the variation in GDP per capita growth, indicating relatively low explanatory power. The estimated equation was: $GDPG_t = 7.106 - 0.132SSE_t$ in contrast, tertiary school enrolment had recorded a positive coefficient of 1.526 and had been statistically significant at the 5% level ($t = 2.911$; $p = 0.044$). The coefficient indicated that a one-percentage-point increase in tertiary school enrolment had been associated with approximately a 1.526 percentage-point increase in GDP per capita growth. The finding suggested that greater participation in tertiary education had been positively associated with sustainable economic growth, potentially reflecting the contribution of higher-level skills, knowledge and productive capacity to economic performance. The R^2 value of 0.679 indicated that tertiary school enrolment had accounted for approximately 67.9% of the variation in GDP per capita growth within the available observations, representing substantially greater explanatory power than the other human capital indicators. The estimated equation was: $GDPG_t = -10.378 + 1.526TSE_t$

DISCUSSION OF FINDINGS

The study examined the effect of human capital development on sustainable economic growth in Nigeria, with GDP per capita growth used as the indicator of sustainable economic growth in line with the growth dimension of SDG 8. Human capital development was captured through government expenditure on education, secondary school enrolment and tertiary school enrolment. The findings revealed that the effects of the three indicators were not uniform, suggesting that the contribution of human capital development to economic growth depended on the particular dimension of education considered.

Government expenditure on education had a positive coefficient of 20.666, although the effect was not statistically significant at the 5% level ($p = 0.146$). The positive coefficient suggested that increased public commitment to education had moved in the same direction as GDP per capita growth; however, the statistical evidence was insufficient to conclude that education expenditure independently influenced sustainable economic growth within the observations examined. This finding partly differed from Ohwofasa and Obeh (2023), who found government spending on education to have a negative and statistically insignificant effect on economic growth in Nigeria, although both studies agreed on the absence of statistical significance. Ohwofasa and Obeh further found primary and secondary school enrolments to have positive and significant effects on economic growth.

The result also differed from Balogun et al. (2023), whose analysis showed that government expenditure on education had a significant positive effect on Nigeria's GDP. Similarly, Nwobia et al. (2023) reported a significant positive relationship between government education expenditure and economic growth and found that increases in education spending contributed positively to GDP growth. In contrast, Eniekezimene et al. (2023) found that government expenditure on education exerted an insignificant negative effect on economic growth in the long run and a significant negative effect in the short run. The differences across these findings indicated that increased educational expenditure did not automatically translate into immediate improvements in economic performance. The effectiveness of such expenditure could have depended on the efficiency of

resource allocation, implementation, educational quality and the period required for educational investment to translate into productive capabilities.

The present finding differed methodologically from these earlier studies in an important respect. Whereas Ohwofasa and Obeh (2023) used aggregate GDP and applied cointegration and error-correction techniques over a relatively long period, and Balogun et al. (2023) examined aggregate GDP within a VECM framework, the present study measured sustainable economic growth using GDP per capita growth. Consequently, the current analysis focused more directly on whether human capital development was associated with improvement in economic output relative to population rather than simply expansion in the absolute size of the Nigerian economy. This distinction was particularly relevant to the study's SDG 8 orientation and could partly explain differences between the results.

Secondary school enrolment recorded a negative coefficient of -0.132 and was statistically insignificant ($p = 0.252$). This implied that increases in secondary school enrolment had not produced a statistically discernible contemporaneous improvement in GDP per capita growth. The negative coefficient should not be interpreted to mean that secondary education was detrimental to economic growth; rather, it indicated that increases in enrolment alone had not been sufficient to generate an immediate positive growth response during the observed period. Human capital accumulation through secondary education could require time before school participants entered productive employment and contributed meaningfully to aggregate productivity.

This result contrasted with Ohwofasa and Obeh (2023), who reported that secondary school enrolment had a positive and significant effect on economic growth. It also differed in direction from Eniekezimene et al. (2023), whose long-run estimates showed a positive but statistically insignificant effect of secondary school enrolment on economic growth. The divergence could be associated with differences in measurement, estimation periods and model specification. In particular, Eniekezimene et al. incorporated government expenditure on health, gross fixed capital formation and different levels of school enrolment within an ARDL framework, whereas the present study isolated the relationship between individual human capital indicators and GDP per capita growth.

The result on secondary enrolment also found some broader support in the more recent evidence of Jemiluyi and Jeke (2024). Their study showed that human capital measured through education did not necessarily generate a favourable direct growth effect in isolation; rather, education played an important complementary role by moderating the relationship between urbanisation and economic growth in Nigeria. Their estimates indicated that the interaction between education and urbanisation contributed positively to economic growth even where the direct effect of the human capital measure was unfavourable. This provided a useful explanation for the present finding: increased educational participation might contribute more strongly to growth when accompanied by complementary employment opportunities, productive infrastructure, technological capacity and an economic structure capable of absorbing educated labour.

Tertiary school enrolment produced the strongest result among the human capital indicators. Its coefficient of 1.526 was positive and statistically significant at the 5% level ($p = 0.044$), suggesting that a one-percentage-point increase in tertiary school enrolment had been associated with approximately a 1.526 percentage-point increase in GDP per capita growth within the available observations. The model also produced an R^2 of 0.679, indicating that tertiary enrolment accounted for a substantial proportion of the variation in GDP per capita growth within its estimation sample. This finding suggested that higher education could have played a more direct role in improving productive skills, specialised knowledge, innovation capacity and labour productivity than increases in enrolment at lower educational levels.

The finding was broadly consistent with Keji (2021), who concluded that human capital had a significant relationship with economic growth in Nigeria and identified student enrolment among the important determinants of economic performance. It was also compatible with Jemiluyi and Jeke's (2024) conclusion that education-based human capital could strengthen Nigeria's growth process when combined with other productive forces. However, the result differed from Eniekezimene et al. (2023), who found tertiary school enrolment to have an insignificant negative effect in the long run, although its short-run effect was positive.

The difference again highlighted the sensitivity of human capital-growth relationships to the growth measure adopted, sample period and econometric specification.

Nevertheless, the significant tertiary enrolment result was interpreted cautiously because only six overlapping observations were available for its estimation. The relatively high explanatory power of the model should therefore not be taken as definitive evidence that tertiary enrolment alone determined Nigeria's sustainable economic growth. Instead, the result provided indicative evidence of a potentially stronger growth association at the tertiary level that could be examined further as more consistent annual observations became available. The mixed findings of the current study were also important when considered alongside Bekele et al. (2024), who examined 30 Sub-Saharan African countries and found that human capital development, measured using years of schooling and returns to education, had a negative and significant relationship with economic sustainability. The authors consequently emphasised educational quality rather than expansion in access alone. The present findings reinforced this broader argument by showing that different indicators of human capital development did not produce identical growth outcomes. The insignificant result for secondary enrolment, in particular, suggested that increasing educational participation by itself might not guarantee sustainable economic growth.

The present study therefore differed from much of the existing Nigerian literature in three important ways. First, rather than treating human capital development as a single aggregate construct, it separately evaluated government education expenditure, secondary enrolment and tertiary enrolment, thereby revealing substantial differences across the individual components. Second, whereas many earlier Nigerian studies measured economic performance using aggregate real GDP, the present study employed GDP per capita growth, thereby relating human capital development to growth in output per person. Third, the study explicitly situated this relationship within SDG 8, thereby linking the human capital-growth debate to the objective of sustained economic growth rather than considering economic expansion in isolation.

This SDG 8 orientation also distinguished the study from Olowookere et al. (2022), who examined human capital development within the sustainable development framework but focused specifically on SDG 1 and poverty reduction, using public investments in education and health. Similarly, Bekele et al. (2024) addressed economic sustainability across a panel of Sub-Saharan African countries, while the present study concentrated specifically on Nigeria and examined the educational dimensions of human capital against a per-capita growth measure. Thus, the contribution of the present study lay not merely in re-examining the familiar relationship between education and economic growth, but in demonstrating how different education-based human capital indicators were associated differently with Nigeria's progress towards the sustained economic growth dimension of SDG 8.

Policy Implication

The findings carry implications for Nigeria's human capital and sustainable growth agenda. The positive but insignificant effect of education expenditure suggests that policy attention should extend beyond allocations to the efficiency, transparency, and quality of educational spending. The insignificant effect of secondary enrolment indicates that expanding access alone may be insufficient unless learning quality, skills relevance, and school-to-work transition are strengthened. The positive and significant effect of tertiary enrolment highlights the potential contribution of advanced skills, innovation, and professional training to productivity and per capita growth. Accordingly, human capital policies aligned with SDG 8 should emphasize educational quality, employability, research capacity, and stronger links between tertiary institutions and productive sectors. Monitoring of education outcomes is essential for improving policy effectiveness.

CONCLUSION AND RECOMMENDATIONS

The study concluded that human capital development had a mixed effect on sustainable economic growth in Nigeria. Government expenditure on education showed a positive but statistically insignificant relationship with GDP per capita growth, while secondary school enrolment produced a negative and insignificant effect.

Tertiary school enrolment, however, had a positive and statistically significant effect, suggesting that higher-level human capital formation contributed more strongly to economic performance. These findings indicated that improvements in human capital could support Nigeria's progress towards SDG 8, but the impact depended on the quality, level, and effectiveness of educational investment. The study therefore underscored the need to move beyond expanding educational access and expenditure towards improving learning outcomes, employable skills, innovation capacity, and the productive utilization of human capital. Based on the conclusion the following recommendations are made:

Government should improve the effectiveness of education expenditure, since the positive but statistically insignificant result suggested that increased spending had not translated into a significant improvement in GDP per capita growth. Greater attention should therefore be given to ensuring that available educational resources are efficiently utilized to produce measurable human capital outcomes.

Policy emphasis should not be placed solely on increasing enrolment. Efforts should also focus on improving the quality and relevance of secondary education so that increased participation can translate more effectively into productive economic outcomes.

Policies that support higher education expansion and improve its capacity to produce productive and skilled graduates should therefore be sustained as part of Nigeria's efforts to promote sustainable economic growth.

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