Research Article

Human Capital Development and Economic Performance in Nigeria: Evidence from Economic Growth and Per Capita Income Models.

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Abstract: This study investigates the impact of human capital development on economic performance in Nigeria, distinguishing between aggregate economic growth and individual economic welfare. Unlike much of the existing literature that treats economic growth and welfare as synonymous, the study adopts a dual-model Autoregressive Distributed Lag (ARDL) framework in which real GDP growth rate and per capita income are specified as separate dependent variables. Human capital is proxied by government expenditure on education, government expenditure on health, and tertiary enrolment rate, using annual time-series data for Nigeria from 1990 to 2023. The ARDL short-run results reveal that government expenditure on education and health exerts a positive and statistically significant effect on real GDP growth, while tertiary enrolment rate negatively affects growth. However, in the long run, education and health expenditures become statistically insignificant, and tertiary enrolment remains negative but insignificant, indicating weak long-term growth transmission. In contrast, the welfare model shows that government expenditure on education and health has a negative and significant effect on per capita income in both the short and long run, whereas tertiary enrolment rate positively and significantly influences per capita income. The findings highlight a clear divergence between growth and welfare outcomes of human capital development in Nigeria. While public human capital investment stimulates short-term economic growth, it fails to deliver sustained growth and broad-based welfare gains. Conversely, higher education enhances individual income prospects despite its weak contribution to aggregate growth. These results underscore the need for efficiency-oriented human capital policies and structural reforms that align education outcomes with labour market absorption to promote inclusive and sustainable economic development.

Keywords: *Human capital development; Economic growth; Per capita income; ARDL; Nigeria.*

1. Introduction

The global economy has shifted towards more knowledge-based sectors, a kind of economy that makes human capital development becomes a central-issue for policy-makers and practitioners that are engaged in economic development both at the national and regional level (Izushi and Huggins, 2004). The importance and relevance of human capital development in the achievement of meaningful and sustainable economic growth and development has been widely acknowledged in both theoretical and empirical studies. No country has achieved sustained economic development without considerable investment in human capital. In this regard, the role of human capital in economic development cannot be overemphasized. Economists generally believed that human capital development is essential in the process of economic growth.

Corroborating this, Adam Smith (1776) specifically included the acquired and useful abilities of all the inhabitants or members of the society in his concept of fixed capital. In the same vein, Alfred Marshal (1890) emphasizes the importance of education as a national investment and regards it as the most Economic growth is fundamental for sustainable development. It is usually difficult for a country, especially a developing country to improve the standard of living of its growing population (GDP per capita) without economic growth. These two aspects of growths (GDP per capita and economic growth) are mainly achieved by the expansion and repair of infrastructures, the improvement of education and health services and the encouragement of foreign and local investments among others (Saad and Kalakech, 2009). Hence, sustained and equitable economic growth coupled with a robust improvement in the living standard of the citizens (Per capita income) are clearly predominant objectives of public spending on human capital development. Human capital as an economic term encompasses health, education and other human capacities that can raise productivity (Todaro and Smith, 2003). Capital and natural resources are passive factors of production while human resources are active factors of production.

Adelakun (2011) describes human capital as the abilities and skills of human resources and human capital development as the process of acquiring and increasing the number of persons who have the skills, education and experience which are critical for the economic growth of the country. Human capital development enhances the skills, knowledge productivity, creativity and inventiveness of people. Adesola (2015) opines that human resources constitute the ultimate basis for the wealth of nations. Capital and natural resources are passive factors of production; human beings are the

valuable of all capital that is invested in human beings. Hence, Miyanda and Venkatesh (2017) observe that human capital is the term economists often use for education, health, and other human capacities that can raise productivity.

active agents who accumulate capital, exploit natural resources, build social, economic, and political organizations, and carry forward national development. Clearly a country that is unable to develop the skills and knowledge of its people and to utilize them effectively in the national economy will be unable to grow economically. In the absence of substantial investment in the development of human capital in any country, sustained economic growth and development would only be a mere wish, never a reality. Therefore, the place of human capital development in economic growth cannot be overemphasized.

In the past, Nigeria has focused on planning and accumulation of physical capital for rapid growth and development, without identifying the important role played by human capital in the development process (Eigbiremolen and Anaduaka, 2014). Atoyebi, Olaleye, Ishola and Kadiri (2013) conclude that most of the indices of human welfare which incorporate income on education and health show that Nigeria's level of human development is low compared with several other countries in the African regions. Of great concern is the deterioration in the quality of education services at all levels, especially the higher education levels where persons are trained to take up leadership roles in science, technology, management and business. In addition, it was recommended by the United Nations that developing countries should invest a minimum of 26% on education and the world Health Organization specified at least 5% on health. Nigeria has not been able to meet this bench mark. In 2023, the education sector got

Corresponding Author: Saliu Mojeed Olanrewaju (Ph.D)

a meagre 6% of the budget while the health sector got about 4.7% (National Budget-Provisional, 2023). The human development index (HDI) has three indicators: income, life expectancy (proxy for health), and knowledge (proxy for education). The rank of countries (as indicated in the 2023 report, page 129) showed that Nigeria ranked 156 with a value of 0.459 among 187 countries.

Nigeria as a country is immensely endowed both in natural and in human resources. The pool of resources from one end to the other is unquantifiable to such extent that, given a dynamic leadership, economic prosperity would have been achieved in late 20th century. In spite of all these abundant resources, Nigeria has failed to realize her full development potential with the topmost priority currently given to sustainable human capital development or people-oriented development by many countries and multilateral organizations. Nigeria's economic growth has been slow and volatile, failing to translate into meaningful improvements in living standards. The country's human capital development has been hindered by inadequate education and healthcare systems, leading to a shortage of skilled workers and low productivity. Consequently, per capita income remains low, and poverty persists. This divergence suggests that economic growth may be weakly inclusive and raises concerns about the effectiveness of human capital development as a transmission mechanism for broad-based welfare improvement.

Most of the empirical studies on Nigeria have largely examined the relationship between human capital and aggregate economic growth, typically using GDP or GDP growth rate as the dependent variable. For instance, Omitogun et al. (2016) and Keji (2021) find that education and health indicators significantly influence economic growth in Nigeria, while Adeneye and Anuolam (2023) report mixed effects of human capital development on economic growth. Although these studies provide important macroeconomic insights, they are limited by their narrow focus on aggregate output and their failure to explicitly assess whether human capital development improves individual economic welfare. More importantly, per capita income, which better captures the average economic well-being of citizens, is often either omitted or treated as a transformed measure of GDP rather than modeled as a distinct outcome variable. This approach masks the possibility that human capital may influence aggregate economic growth and per capita income through different channels. In an economy like Nigeria, characterized by rapid population growth, labour market rigidities, and structural bottlenecks, increases in aggregate output may be diluted at the per capita level, thereby weakening the welfare effects of human capital accumulation.

Studies that attempt to incorporate per capita income into the analysis reveal further ambiguities. Maku et al. (2019) and Sanni and Onakoya (2025) find that some human capital proxies exert insignificant or inconsistent effects on GDP per capita, suggesting that improvements in education and health do not automatically translate into higher average incomes. These mixed findings point to potential methodological limitations and structural constraints that weaken the human capital–welfare nexus in Nigeria. Additionally, Lawanson and Evans (2019) argue that the impact of human capital on economic performance in Nigeria is constrained by weak structural transformation and misallocation of skilled labour. This implies that even when human capital contributes to output growth, its effect on per capita income may be muted in the absence of complementary economic structures. Such insights further underscore the need to distinguish between growth outcomes and welfare outcomes when assessing the role of human capital.

Despite these concerns, the existing empirical studies have not sufficiently addressed the possibility that human capital may exert differential impacts on economic growth and per capita income in Nigeria. Most studies rely on a single-equation framework, implicitly assuming that improvements in aggregate output automatically improve average income. This assumption remains empirically questionable in the Nigerian context and represents a significant gap in the literature. It is against this backdrop that this current study identifies the shortcomings of empirical evidence on the distinct effects of human capital development on economic growth and per capita income in Nigeria. By constructing two separate but complementary models, one in which economic growth is dependent on human capital and another in which per capita income is dependent on human capital.

Another methodological shortcoming in the existing literature lies in the econometric techniques employed. Many studies rely on static regression models or traditional cointegration methods that impose restrictive assumptions regarding the order of integration of variables and often fail to adequately capture dynamic adjustments. Given that macroeconomic variables in Nigeria frequently exhibit mixed orders of integration, such methods may lead to biased or inefficient estimates and contribute to the mixed empirical findings as reported in the past research works of Omitogun et al. (2016) and Adeneye & Anuolam (2023).

Therefore, the central research problem addressed in this study is the lack of empirical evidence on the distinct short-run and long-run effects of human capital development on economic growth and per capita income in Nigeria, using a dynamic and flexible econometric framework. By employing separate ARDL models in which economic growth and per capita income are treated as distinct dependent variables, this study seeks to provide a more nuanced understanding of how human capital influences both macroeconomic performance and average living standards in Nigeria. Addressing this problem is essential for designing human capital policies that not only promote economic growth but also ensure inclusive and sustainable improvements in welfare.

The other aspects of this research work are structured as follows: section 2 presents the review of empirical literatures, section 3 explains the data set and research method. Section 4 reports the results and discussion of findings, while section 5 present the conclusion and policy recommendations.

2. Literature Review

Omitogun, Longe, and Ayinde (2016) examined the relationship between human capital development and economic growth in Nigeria using annual time-series data. Human capital was proxied by government expenditure on education and health, while economic growth was measured by real gross domestic product (GDP). Employing regression and cointegration techniques, the study found that expenditure on education exerted a positive and statistically significant effect on economic growth, whereas health expenditure showed a weaker influence. Although the study confirms the relevance of human capital in driving output growth, it is limited by its exclusive focus on aggregate GDP, thereby neglecting welfare-oriented indicators such as per capita income.

Keji (2021) investigated the impact of human capital development on economic growth and employment in Nigeria using time-series data and cointegration-based methods. Education and health indicators were found to have a positive long-run effect on economic growth. However, the study revealed that short-run effects were largely insignificant, suggesting delayed transmission of human capital investments to output growth. Despite its contributions, the study did not explicitly

analyze per capita income, making it difficult to ascertain whether growth gains translated into improvements in average living standards.

Adeneye and Anuolam (2023) further explored the human capital–growth nexus in Nigeria using education and health expenditure as proxies for human capital. Applying econometric techniques such as Ordinary Least Squares and error correction models, the authors reported mixed results, with some human capital indicators exerting insignificant or weak effects on economic growth. The study concludes that inefficient allocation and implementation of human capital investments may undermine growth outcomes. Nonetheless, the analysis remains limited to aggregate economic growth, without assessing individual welfare outcomes.

Maku, Ajike, and Chinedu (2019) analyzed the impact of human capital development on economic performance using GDP per capita as a proxy for welfare. Their findings indicate that education and health variables exerted insignificant or inconsistent effects on per capita income, particularly in the short run. The authors attributed this outcome to structural rigidities, population growth, and labour market inefficiencies. Although the study incorporates a welfare indicator, it does not distinguish clearly between growth and welfare mechanisms within a unified analytical framework.

Sanni and Onakoya (2025) examined the relationship between public expenditure, human capital development, and economic welfare in Nigeria, using GDP per capita as the dependent variable. Employing time-series techniques, the study found that education expenditure positively influenced per capita income, while health expenditure exhibited negative or insignificant effects. These findings suggest that not all components of human capital contribute equally to welfare improvement. However,

the study does not compare these welfare effects with aggregate economic growth outcomes, thereby limiting its policy implications.

Lawanson and Evans (2019) investigated the role of human capital within the broader context of structural transformation in Nigeria. Using macroeconomic data and structural modeling approaches, the authors found that human capital contributes to economic growth only when complemented by effective structural transformation and efficient labour allocation. They argue that misallocation of skilled labour and weak industrial absorption reduce the impact of human capital on both growth and welfare. While the study provides important structural insights, it does not empirically distinguish between aggregate growth and per capita income effects.

3. Research Method

3.1 Theoretical Framework

This study is anchored on the theoretical framework of Robert Barro (1990) endogenous growth model that emphasized endogenous factors that significantly impact economic growth potential within the economy. However, the modern version of Barro's growth model is more suitable for this study due to its incorporating of factor that promotes economic growth. The modern version of barro's growth model focuses on four variables: output (Y), labour (L), knowledge or the effectiveness of labour (A) and government purchases of goods and services (G). These are combined to produce output; the production function takes the form:

$$Y_t = A_t \cdot L_t^{1-\alpha} \cdot K_t^{\alpha} \cdot G_t^{\beta}$$

Where: α and β are both less than one.

3.2 Model Specification

Based on the theoretical proposition of Barrow's growth model explained above, the model for this study is hereby specified as follows:

Corresponding Author: Saliu Mojeed Olanrewaju (Ph.D)

$RGDPgr = F(TEDU, THEA, TER)...eq \ 3.1$
$PCI = F(TEDU, THEA, TER)......eq \ 3.2$

In econometric and explicit forms, equation 3.1 and 3.2 are presented as follows:

$$RGDPgr_t = \alpha_0 + \alpha_1 TEDU_t + \alpha_2 THEA_t + \alpha_3 TER_t + \varepsilon_t.... eq \ 3.3$$

$$PCI_t = \beta_0 + \beta_1 TEDU_t + \beta_2 THEA_t + \beta_3 TER_t + \varepsilon_t.... eq \ 3.4$$

Where:

$RGDPgr$ is the Real Gross Domestic Product growth rate

PCI is the Per Capita Income

$TEDU$ is the total government expenditure on education

$THEA$ is the total government expenditure on health

TER is the Tertiary Enrolment Rate

ε_t is the error term

3.3 Sources of Data

The data set for this research work contains the annual time series spanning from 1990 to 2023. Data on the Real GDP growth rate and Per Capita Income are sourced from World Development Indicator (WDI) of World Bank databank. Data on total government expenditure on education (TEDU), total government expenditure on health (THEA) and Tertiary Enrolment Rate (TER) are sourced from Central Bank Nigeria Statistical Bulletin, (2024).

3.4 Estimation Techniques

In bit to incorporate the dynamic interactions and long-run equilibrium in the investigation of human capital effects on economic growth and per capital income, the model in eq 3.3 and 3.4 is redesigned in an Autoregressive Distributed Lag (ARDL) framework as proposed by Pesaran, Shin and Smith (2001). The standard ARDL $(P, q_1, q_2, ...)$ model for this study is therefore presented as follows:

$$GDPgr_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 GDPgr_{t-1} + \sum_{j=0}^{q_1} \alpha_j TEDU_{t-j} + \sum_{k=0}^{q_2} \alpha_k THEA_{t-k} + \sum_{l=0}^{q_3} \alpha_l TER_{t-l} + \varepsilon_t .... eq \ 3.5$$

$$PCI_t = \beta_0 + \sum_{i=1}^{p} \beta_1 GDPgr_{t-1} + \sum_{j=0}^{q_1} \beta_j TEDU_{t-j} + \sum_{k=0}^{q_2} \beta_k THEA_{t-k} + \sum_{l=0}^{q_3} \beta_l TER_{t-l} + \varepsilon_t .... eq \ 3.6$$

4. Results and Discussion

4.1 Unit Root Test Results

This aspect of the study examines the stochastic properties of the series. Testing for unit roots is essential in time series analysis to determine the stationarity of variables before conducting co-integration tests. The presence of a unit root indicates that the series is non-stationary, meaning its statistical properties such as mean and variance change over time. Conversely, the absence of a unit root implies that the series is stationary, and its stochastic process remains stable around a constant mean and variance. Establishing the stationarity of each variable ensures the reliability of subsequent long-run and short-run analyses in the study.

Table 4.1: Philips Perron Unit Root Test Results

Variable	Test Statistics	Critical Value	Probability	Order of Integration
CPI	-4.631320	-3.653730***	0.0008	I(1)
TEDU	-4.356859	-3.653730*	0.0017	I(1)
RGDPgr	-2.917437	-2.617434*	0.0544	I(1)
THER	-5.634681	-3.653730*	0.0001	I(0)
TER	3.053480	2.954021***	0.0043	I(0)

NOTE: (***), (*) represent 1%, 10% level of significance respectively.

The Phillips-Perron unit root test was adopted to test the stationarities of all variables in the table 4.1 above. The results show that CPI**,** TEDU, and RGDPgr are all stationary after first differencing, indicating they are integrated of order one, I(1**)**. While both THER and TER are stationary at level, I(0). Overall, the variables exhibit a mix of I(0) and I(1) orders of integration, suggesting that the ARDL model is appropriate for further analysis.

4.2 ARDL Co-Integration Test

Having established Stationarities of all variables, next is to determine the existence of a long-run equilibrium relationship among the variables in the model. To realize this, the study employed ARDL technique. The co-integration results of the variables through ARDL bound test are presented below:

Table 4.2: ARDL Bound Test for RGDPgr

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	10.32761	10%	2.37	3.21
K	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Based on the results of the ARDL bound test in the table 4.2 above, the F-statistic value of 10.33 exceeds the upper critical bound at the 1% significance level for both I(0) and I(1) series. This indicates the rejection of the null hypothesis of no long-run relationship. Therefore, there is an existence of a significant long-run cointegrating relationship among the variables.

Table 4.3: ARDL Short-run Estimation for RGDPgr

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TEDU)	89.35729	39.87089	2.241166	0.0387
D(TEDU(-1)	162.5241	44.24916	3.672931	0.0019
D(THEA)	59.37332	33.38803	2.280740	0.0041
D(THEA(-1))	97.50934	30.94966	3.150579	0.0058
D(TER)	-11.56698	21.81033	-2.865561	0.0032
D(TER(-1))	-10.27434	2.762953	-3.718606	0.0017
CointEq(-1)	-0.235517	0.000691	7.986752	0.0000

Table 4.4: ARDL Long-run Estimation for RGDPgr

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TEDU	0.087304	0.209433	0.416860	0.6800
THEA	0.077806	0.273013	0.284988	0.7778
TER	-0.005733	0.006181	-0.927491	0.3616
C	30.52170	13.69004	2.229482	0.0340

EC = GDPgr - (0.087304*TEDU + 0.077806*THEA -0.00573*TER + 30.52170

Table 4.3 and 4.4 above show the ARDL for both short-run and long-run estimations for GDPgr respectively. Results in the table 4.3 reveal that total government expenditure on education (TEDU) and total government expenditure on health (THEA) exert positive and statistically significant effects on real GDP growth rate in the short-run. The impact in the short-run implies that increased public spending on education and health stimulates economic growth in the short-term by improving labour productivity, enhancing workforce efficiency, and reducing productivity losses associated with poor health. These findings are consistent with endogenous growth theory (Lucas, 1988; Romer, 1990), which emphasizes the role of human capital investment in driving output growth. Empirically, these results align with studies such as Omitogun et al. (2016) and Keji (2021), who found that public expenditure on education and health positively influences economic growth in Nigeria, particularly in the short run. The results also corroborate Adeneye and Anuolam (2023), who argue that human capital investments can stimulate output growth even when structural constraints exist.

However, in the same table 4.3, the tertiary enrolment rate (TER) exhibits a negative and statistically significant effect on real GDP growth in the short run. This suggests that increases in tertiary enrolment may initially reduce output growth due to opportunity costs, such as temporary withdrawal of labour from productive activities, skills mismatch, or inefficiencies in the tertiary education system. This finding contrasts with the conventional expectation that higher enrolment promotes growth but aligns with studies reporting short-run adverse effects of education variables in developing economies where education quality and labour market absorption are weak (Maku et al., 2019).

Results of the long run estimates in table 4.4 reveal that government expenditure on education and health remain positive but become statistically insignificant in explaining real GDP growth. This suggests that while such expenditures may stimulate short-run economic activity, their long-run growth effects are weakened by structural inefficiencies, poor implementation, corruption, and diminishing returns. This finding contrasts with Keji (2021), who reported significant long-run effects, but aligns with Adeneye and Anuolam (2023) and Lawanson and Evans (2019), who argue that human capital investments in Nigeria often fail to generate sustained growth due to weak institutional quality and limited structural transformation. Similarly, the negative but insignificant long-run effect of tertiary enrolment rate indicates that tertiary education has not translated into sustained growth-enhancing productivity gains. This may reflect graduate unemployment, underemployment, and skills mismatch, which dilute the long-term growth impact of higher education. The coefficient of the error correction term (CointEq(-1) = -0.235517) is negative and statistically significant at the 1% level (p = 0.0000). This confirms the presence of a long-run equilibrium relationship among the variables. The coefficient value indicates that about 23.5% of the short-run disequilibrium is corrected each period, showing a moderate speed of adjustment toward long-run stability.

Table 4.5: ARDL Bound Test for RGDPgr

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	12.98543	10%	3.17	4.11
K	2	5%	3.19	4.67
		2.5%	2.45	3.12
		1%	2.25	3.96

Based on the results of the ARDL bound test in the table 4.5 above, the F-statistic value of 12.98 exceeds the upper critical bound at the 1% significance level for both I(0) and I(1) series. This indicates the rejection of the null hypothesis of no long-run relationship. Therefore, there is an existence of a significant long-run co-movement among the variables.

Table 4.6: ARDL Short-run Estimation for PCI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TEDU)	-19.54321	13.65432	-2.432190	0.0132
D(TEDU(-1)	-62.50875	17.98654	-2.874232	0.0065
D(THEA)	-23.76432	20.54287	-3.763420	0.0094
D(THEA(-1))	-27.76423	22.65242	-2.762543	0.0033
D(TER)	81.65092	25.76291	2.809624	0.0011
D(TER(-1))	11.76425	12.70972	2.709824	0.0017
CointEq(-1)	-0.331654	0.008755	5.542462	0.0000

Table 4.7: ARDL Long-run Estimation for PCI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TEDU	-9.094432	4.652498	-1.873208	0.0023
THEA	-23.75423	6.764232	-2.432555	0.0008
TER	17.05733	7.206181	2.927491	0.0016
C	26.65242	10.65232	3.229872	0.0040

EC = GDPgr - (-9.09443*TEDU -23.7542*THEA + 17.0573*TER + 26.65242

In contrast to the growth model, the ARDL short-run estimate results in table 4.6 show that government expenditure on education and health has a negative and statistically significant effect on per capita income (PCI), while tertiary enrolment rate has a positive and significant effect. The negative short-run effects of education and health spending on per capita income suggest that increased public expenditure may initially crowd out private consumption or require higher taxation or borrowing, thereby reducing average income in the short run. This result aligns with Maku et al. (2019) and Sanni and Onakoya (2025), who reported that public human capital expenditure does not automatically improve welfare outcomes in Nigeria. Conversely, the positive short-run effect of tertiary enrolment on per capita income indicates that higher education enhances individual earning capacity and employability, even if aggregate output does not immediately respond. This finding supports human capital wage theories and aligns with Sanni and Onakoya (2025), who found that education improves economic welfare more directly than it stimulates aggregate growth.

The long-run ARDL estimates results in table 4.7 reinforce the short-run findings. Government expenditure on education and health continues to exert negative and

Corresponding Author: Saliu Mojeed Olanrewaju (Ph.D)

statistically significant effects on per capita income (PCI)**,** whereas tertiary enrolment rate remains positive and significant**.** The persistent negative effect of public education and health spending on per capita income suggests inefficiencies in expenditure allocation, weak targeting, and limited pass-through to household income. This finding strongly aligns with Lawanson and Evans (2019)**,** who emphasize that misallocation of human capital investments reduces their welfare-enhancing potential. On the other hand, the sustained positive impact of tertiary enrolment on per capita income indicates that higher education plays a critical role in improving long-term living standards, even when macroeconomic growth remains subdued. This result contrasts with studies that find weak welfare effects but supports the argument that education enhances income distribution and individual productivity over time. Also, The coefficient of the error correction term (CointEq(-1) = -0.331654) is negative and statistically significant at the 1% level (p = 0.0000). This confirms the presence of a long-run equilibrium relationship among the variables. The coefficient value indicates that about 33.1% of the short-run disequilibrium is corrected each period, showing a moderate speed of adjustment toward long-run stability.

5.0 Conclusion and Policy Recommendation

The empirical findings in this study reveal a clear divergence between growth and welfare effects of human capital development in Nigeria. In the short run, government expenditure on education and health exerts a positive and statistically significant effect on real GDP growth, indicating that public investment in human capital can stimulate economic activity. However, these effects do not persist in the long run, as education and health expenditures become statistically insignificant, suggesting that structural inefficiencies and weak implementation undermine their long-term growth impact. In addition, tertiary enrolment rate negatively affects economic growth in the short run and remains insignificant in the long run, reflecting opportunity costs, skills mismatch, and limited absorptive capacity of the economy.

In contrast, the welfare model presents a different pattern. Government expenditure on education and health exerts a negative and statistically significant effect on per capita income in both the short and long run, indicating that increased public spending has not translated into improved average living standards. Conversely, tertiary enrolment rate positively and significantly influences per capita income in both periods, underscoring the role of higher education in enhancing individual earning capacity despite its weak contribution to aggregate growth.

Overall, the results suggest that while human capital investment can stimulate short-term economic growth, it has been less effective in delivering sustained growth and broad-based welfare improvements in Nigeria. These findings highlight the importance of distinguishing between growth and welfare outcomes and validate the methodological relevance of modeling them separately.

From a policy perspective, the results imply that increasing education and health expenditure alone is insufficient to achieve inclusive economic development. Policy emphasis should shift toward improving the efficiency, quality, and accountability of human capital spending. Strengthening the labour-market relevance of tertiary education through curriculum reform and skills alignment is crucial to mitigating its negative growth effects while enhancing welfare outcomes. Moreover, human capital development should be complemented by structural reforms aimed at expanding productive employment opportunities, particularly in the private and industrial

Corresponding Author: Saliu Mojeed Olanrewaju (Ph.D)

sectors, to ensure that educational attainment translates into both higher output and improved living standards.

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