RESEARCH ARTICLE
https://doi.org/10.31063/AlterEconomics/2026.23-2.6
UDC 330.341, 330.354
JEL G01, F37

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# The Impact of Human Development on Sustained Economic Growth: Evidence from Nigeria[1]

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**For citation:** Awuna, J. M., & Malkina, M. Yu. (2026). The Impact of Human Development on Sustained Economic Growth: Evidence from Nigeria. *AlterEconomics, 23*(2), 355–372.
https://doi.org/10.31063/AlterEconomics/2026.23-2.6

**Abstract.** This paper examines the influence of human development on sustained economic growth in Nigeria. Specifically, it investigates the combined effects of the Human Development Index, public expenditure on education and healthcare, unemployment rate, and foreign direct investment on the country's economic growth. The study employs quarterly time series data sourced from the World Bank and constructs an Autoregressive Distributed Lag (ARDL) model to derive short-run and long-run coefficients reflecting the impact of the Human Development Index and public spending on education and healthcare on economic growth. The stationarity of the time series is assessed using the Augmented Dickey-Fuller (ADF) test, while the ARDL bounds cointegration test is applied to establish the presence of a long-run relationship. Diagnostic and stability tests were conducted to verify the accuracy and reliability of the model estimates. The study finds that in the short run, the Human Development Index, public healthcare expenditure, and public education expenditure all exert a statistically significant and positive effect on economic growth in Nigeria, while unemployment has a negative effect. In the long run, only the Human Development Index has a positive impact on economic growth, suggesting that sustained progress depends on comprehensive improvements in human development outcomes. The study concludes that public spending on healthcare and education serve as effective short-run instruments, while the Human Development Index functions as a long-run target indicator for achieving sustainable economic growth. This research adds to the existing body of knowledge by bringing together a range of human development indicators into a single, comprehensive ARDL model, drawing on the latest post-pandemic data. However, the study is limited by data interpolation and suggests that future research could explore the use of sector-specific human capital indicators and alternative econometric methodologies.

**Keywords:** Human Development Index, government expenditure on education, government expenditure on healthcare, economic growth, human capital, unemployment, gross domestic product

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ИССЛЕДОВАТЕЛЬСКАЯ СТАТЬЯ

# Влияние человеческого развития на устойчивый экономический рост: случай Нигерии

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**Для цитирования:** Авуна, Д. М., Малкина, М. Ю. (2026). Влияние человеческого развития на устойчивый экономический рост: случай Нигерии. *AlterEconomics, 23*(2), 355–372. https://doi.org/10.31063/AlterEconomics/2026.23-2.6

**Аннотация.** В работе исследуется влияние человеческого развития на устойчивый экономический рост в Нигерии. Рассматривается совместное воздействие таких факторов, как Индекс человеческого развития, государственные расходы на образование и здравоохранение, уровень безработицы и прямые иностранные инвестиции, на экономический рост в стране. В исследовании использованы квартальные данные временных рядов 2003–2023 годов, предоставленные Всемирным банком. Построена авторегрессионная модель с распределенными лагами (ARDL-модель) для получения краткосрочных и долгосрочных коэффициентов влияния Индекса человеческого развития и государственных расходов на образование и здравоохранение на экономический рост. Стационарность временных рядов определена с помощью расширенного теста Дики-Фуллера (ADF-тест), а для установления наличия долгосрочной взаимосвязи использован тест коинтеграции ARDL. Для установления точности и надежности оценок модели были проведены диагностические тесты и тесты на устойчивость. Исследование показало, что в краткосрочной перспективе Индекс человеческого развития, государственные расходы на здравоохранение и государственные расходы на образование оказывают статистически значимое и положительное влияние на экономический рост в Нигерии, в то время как безработица оказывает отрицательное влияние на экономический рост страны. В долгосрочной перспективе только Индекс человеческого развития положительно влияет на экономический рост, указывая на то, что поступательный прогресс зависит от комплексного улучшения показателя человеческого развития. Таким образом, доказано, что политика, использующая государственные расходы на здравоохранение и образование как текущие инструменты, и Индекс человеческого развития как долгосрочный целевой показатель, может способствовать устойчивому экономическому росту. Данное исследование дополняет существующее знание, включая разнообразные показатели человеческого развития в рамках комплексной модели ARDL с использованием последних данных постпандемического периода. Однако исследование ограничено интерполяцией данных и предполагает, что в будущих исследованиях можно было бы рассмотреть использование отраслевых показателей человеческого капитала и альтернативных эконометрических методологий.

**Ключевые слова:** индекс человеческого развития, государственные расходы на образование, государственные расходы на здравоохранение, экономический рост, человеческий капитал, безработица, валовой внутренний продукт

## 1. Introduction

Economic development and human well-being are interrelated phenomena that have long preoccupied economists and policy-makers working on development issues worldwide. Gross domestic product (GDP) is widely regarded as the primary determinant of economic growth; however, contemporary scholarship has broadened this conception beyond mere improvements in total national output to encompass enhancements in the living standards of the general population (Kaminitz, 2023). In this regard, the degree of accessibility to quality education and healthcare, as key indicators of human development, is increasingly recognized as vital to a country's overall economic growth.

Research on economic development distinguishes between economic growth, which addresses the material needs of the populace, and human development, which extends beyond economic prosperity to encompass the overall quality of human life, including education and healthcare (Raj et al., 2024). Increasing government spending on education and healthcare leads to a substantial increase in economic output (Jerry et al., 2025). However, persistent regional disparities, insufficient funding, and policy implementation failures hinder the full impact of economic growth on human capital development in the country.

The relationship between economic prosperity and human development is, therefore, best understood as bidirectional rather than unidirectional. On the one hand, accelerated economic growth expands the budgetary resources available for social investment, which in turn facilitates human capital accumulation and enhances workforce quality. On the other hand, improvements in human development indicators raise labor productivity, thereby reinforcing and sustaining economic growth. This dynamic interdependence suggests that effective economic policy must simultaneously pursue both objectives rather than treating them as sequential or competing priorities (Reniati et al., 2023).

Nigeria presents a unique case for examining the relationship between economic growth and human development. As one of Africa's largest economies and a country richly endowed with natural resources, it possesses considerable foundations for sustained economic expansion (Abdulkarim, 2023). Yet despite these advantages, Nigeria has consistently struggled to translate economic gains into improved living standards through meaningful investment in human development indicators such as education and health (United Nations, 2022; Abiola, 2025). Volatile oil prices compound this challenge, exposing the economy to recurring fluctuations that directly constrain government spending on social sectors (Ogunjumo et al., 2023). Existing studies have documented positive effects of both education expenditure (Adeyemo, 2024) and health expenditure (Zummo & Hamza, 2025) on key economic indicators, including GDP growth. However, this body of work consistently highlights that structural imbalances, including regional inequalities, inefficient resource allocation, and weak policy implementation, continue to limit the potential of human capital as a driver of long-term growth.

This research seeks to add to the existing knowledge base by assessing the combined contribution of education and healthcare expenditure, alongside other macroeconomic variables, to Nigeria's economic growth. While previous Nigerian studies have employed the ARDL methodology, the novelty of this research lies not in its econometric approach per se, but in how it integrates data sources, updates the empirical record, and adopts a broader conceptualization of human progress. Unlike earlier analyses that examined health and education spending in isolation, this study incorporates the Human Development Index to better capture the complex linkages between well-being and economic output. The study further extends the analytical timeframe to 2023, encompassing the post-COVID-19 recovery period — a phase that remains underexplored in the Nigerian context. The conversion of annual data into quarterly observations sharpens the analysis by enabling the detection of short-run dynamics and cyclical patterns in growth. Finally, the inclusion of unemployment and foreign direct investment enriches the analytical framework, offering a more comprehensive account of how human development interacts with broader economic outcomes across Nigeria.

This paper is organized into the following sections. The introduction is followed by a review of the relevant literature in Section 2, which identifies research gaps, explains

how this study addresses them, and highlights its contribution to the literature. Section 3 analyzes human development trends, government investment in education and health, and economic growth in Nigeria in the context of the country's economic policy. Section 4 outlines the data sources and describes the models and methods used for the analysis. Section 5 presents the results of the short-term and long-term economic growth models, reports the relevant diagnostic tests, and discusses the findings in relation to those of previous studies. Section 6 concludes the study and offers policy recommendations based on the results.

## 2. Literature Review

Previous empirical studies across countries have examined the relationship between economic growth and human development indicators. For example, the above-cited study by Raj et al. (2024), using Dumitrescu and Hurlin's panel causality model, found that economic growth and the non-income components of the Human Development Index exhibit a bidirectional relationship. The study concluded that both secondary and higher education play an important role in shaping sectoral economic activity. However, the influence of higher education is particularly strong in the service sector, while the contribution of secondary education is stronger in manufacturing.

Giyasova et al. (2025) examined the long-run relationship between environmental conditions, economic growth, and human development in South Korea from 1996 to 2021 using fully modified ordinary least squares (FMOLS) and canonical cointegration (CCR) methods. Their results suggest that improving the Human Development Index contributes to long-term economic progress, and economic growth, in turn, steadily improves human development. These results also support the idea of a bidirectional relationship between the two variables.

A broader perspective on the relationship between economic growth and human development emerges from comparative cross-national studies. Mazlum (2024), for instance, conducted a cross-country analysis covering Mexico, Indonesia, Nigeria, and Turkey using panel cointegration methods over the period 2003–2022, examining the interplay among economic growth, human development, urbanisation, and ecological footprint. The study found that improvements in the Human Development Index were associated with a reduction in ecological footprint, while economic growth exerted only a marginal increase in environmental pressure, suggesting that advancing human development may contribute meaningfully to environmental sustainability. Similarly, Awoyemi et al. (2024) investigated the impact of human capital development on economic growth across West African countries using panel ordinary least squares (POLS), fully modified ordinary least squares (FMOLS), and dynamic ordinary least squares (DOLS) estimations, concluding that investments in education, health, and skills development are conducive to economic growth. At the sub-national level, Machmud and Sidharta (2023) drew on panel data from an Indonesian province spanning 2010–2022 to analyze the relationship between regional development, human development, and poverty, finding a positive and statistically significant effect of human development on economic growth.

Institutional conditions and the political environment act as mediating conditions in the relationship between human development and economic growth, making this relationship multifaceted. Opoku et al. (2024) analyzed data from 40 African countries and found a non-linear, U-shaped relationship between financial inclusion and economic growth, with human capital development fully mediating this link. In a related vein,

Royanti et al. (2025) used moderation regression analysis to explore how economic growth moderates the relationship between public finance, human development, and income inequality in Indonesia between 2017 and 2023. They found that while the Human Development Index was significantly and negatively associated with income inequality in its direct effect, this association became positive when interacting with economic growth. These results suggest that the impact of human development depends largely on the broader macroeconomic environment and prevailing economic growth trends.

Education is one of the main pillars of human development and has always been considered a key factor of economic growth in many countries. For example, Bah (2023) conducted a cross-country analysis using data from 2002 to 2020 and the GMM estimation technique and found that growth effects of education tend to be stronger in low- and middle-income countries than in high-income countries. Therefore, for economies like Nigeria, investing in education can pave the way for a critical path to accelerating long-term economic growth. Meilisa et al. (2024) examined the short- and long-run impact of educational enrollment rates on economic growth in Indonesia using the ARDL model and the Bounds test cointegration method. They found that increased investment in education, particularly at the tertiary level, significantly contributes to long-term economic growth. They also emphasized that education shapes human resources and promotes sustainable economic development by creating a stronger pool of skilled workers. Furthermore, Abdelgany et al. (2024), using data for Egypt from 1990 to 2021 and the autoregressive distributed lag (ARDL) bounds testing method, confirmed the positive impact of education spending at all levels on economic growth. However, lower spending per student reduces this effect.

Investments in health constitute the second most important pillar of human capital development. For example, Elawady and Ahmed (2024), using data for Saudi Arabia from 1988 to 2018 and ARDL methodology, found that total capital stock, education expenditure, and health expenditure have a statistically significant positive impact on short-term economic growth. In the long-term, total capital stock and education expenditure also positively affect economic growth, while education expenditure affects it negatively. Similarly, Odionye and Odionye (2024), using multivariate regression analysis and data for Nigeria from 1981 to 2021, found that public spending on both education and health has a positive and statistically significant impact on labor productivity. But only public spending on education has a significant positive impact on economic growth.

Recent research increasingly emphasizes that education and health investments operate synergistically, with their combined impact exceeding the sum of their individual effects. Zummo and Hamza (2025) examined the relationship between economic development and human capital investment in Nigeria using the autoregressive distributed lag (ARDL) model, drawing on data spanning 1982 to 2023. They found that health expenditure alone has a weak or negative impact on economic growth. However, when health and education spending are considered jointly, their combined impact is positive and significant. Investments in education and health complement each other: education increases the productivity of healthy workers, and improved health allows educated people to realize their productive potential. Anagun and Sokunbi (2024) examined the impact of human capital formation on economic growth in Nigeria between 1990 and 2021 using disaggregated ARDL analysis. They found that government expenditure on health and education had a significant positive effect on long-run economic growth. The foregoing is in line with modern development

thought, which sees improvements in human development as an important drive towards sustainable economic growth.

Most of the studies reviewed above, including Raj et al. (2024), Mazlum (2024), Bah (2023), Opoku et al. (2024), Awoyemi et al. (2024), and Machmud and Sidharta (2023), rely on pooled data methods, which can obscure distinct national patterns. Given Nigeria's dependence on crude oil exports, pronounced regional inequalities, persistent unemployment, and recurring economic volatility, a country-specific analysis is more appropriate than conclusions drawn from aggregated regional datasets. While studies such as Adeyemo (2024), Zummo and Hamza (2025), and Odionye and Odionye (2024) have explored the relationship between education and health spending and economic growth in Nigeria, many focus narrowly on short-run dynamics, overlook broader human development indicators such as the Human Development Index, or fail to account for the interplay among unemployment, foreign direct investment, and human capital development.

Further limitations are evident in the methodological approaches of other studies. Anagun and Sokunbi (2024), Giyasova et al. (2025), and Elawady and Ahmed (2024) rely on annual data and conventional regression techniques, which are ill-suited to capturing the dynamic adjustment between short-run disequilibria and long-run stability. Meanwhile, Abdelgany et al. (2024) and Meilisa et al. (2024) examine education or health expenditure in isolation, offering an incomplete account of the channels through which human development influences productivity and macroeconomic performance. There is also a notable scarcity of research on post-COVID-19 growth and human development dynamics in Nigeria.

This study addresses these gaps along four dimensions. First, it integrates education expenditure, health spending, and the Human Development Index within a single ARDL framework, examining both their individual and combined effects on economic growth. Second, it incorporates unemployment and foreign direct investment, broadening the analytical scope to reflect the wider macroeconomic forces shaping national output. Third, it converts annual data into quarterly observations, enhancing precision and capturing short-run fluctuations that annual data tends to conceal. Fourth, it extends the analytical timeframe into the post-pandemic period, providing current evidence directly relevant to economic policymaking in Nigeria.

## 3. Analysis of Human Development Trends and Economic Policies in Nigeria

### *3.1. Trends in Nigerian Government Spending on Health and Education*

Figure 1 illustrates the trend in government expenditure on education in Nigeria. The graph shows that budget allocations for education increased steadily between 2004 and 2008. This was made possible by the enactment of the Universal Basic Education Act during the presidency of Olusegun Obasanjo. This act was intended to guarantee free primary and lower secondary education in the country. Then, during the global financial crisis of 2008–2010, Nigeria's education sector faced funding cuts. Further cuts occurred in 2011 with the creation of the Tertiary Education Trust Fund (TETFund)[1]. This fund was tasked with distributing, managing, and monitoring education taxes

[1] Tertiary Education Trust Fund. (2021). *Annual report 2021*. https://tetfund.gov.ng/publications#report (Date of access: 06.02.2026).

for public higher education institutions, allowing additional funds to be allocated for infrastructure improvements and faculty training (TETFund, 2021).

Figure 1 also shows that education funding has declined significantly since 2016 due to the economic downturn, exacerbated in 2018–2020 by the fall in the price of oil, Nigeria's main export, and the global COVID-19 pandemic. In the post-crisis period, starting in 2020, there was a gradual increase in education funding, followed by a decrease in 2021. In 2022, the education sector received negligible funding from the general budget, while in 2023, there was a slight increase in the allocation to education, amounting to only about 4.4 % of the national budget, amounting to 3.01 trillion naira (US$6.5 billion) out of the total budget of 21.83 trillion naira (US$47.5 billion) (Nwoke et al., 2024).

Figure 2 shows that between 2007 and 2014, health expenditure as a percentage of total government expenditure was relatively low and remained virtually unchanged. Despite Nigeria, along with other African Union members, signing the Abuja Declaration in 2001 and committing to allocating 15 % of the country's budget to health, it has consistently

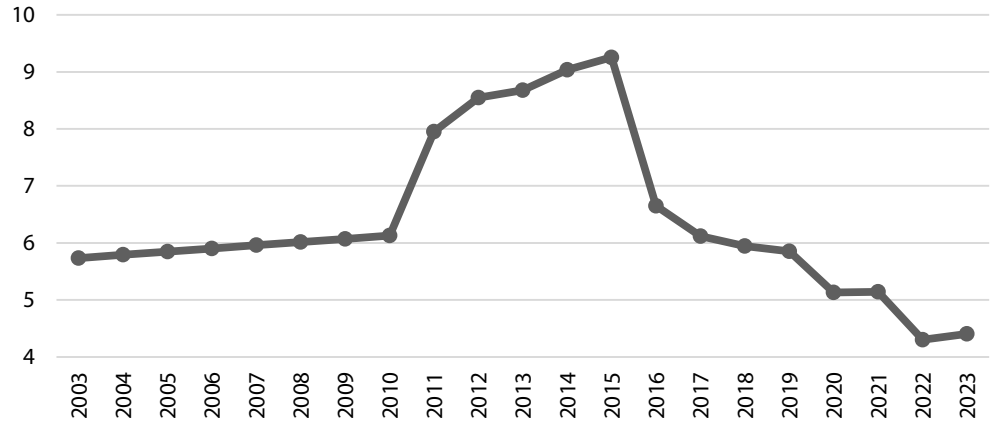



**Fig. 1.** *Dynamics of Nigeria's Government Expenditure on Education, % of Total Government Expenditure*
*Source: Author's Computations Using EXCEL*

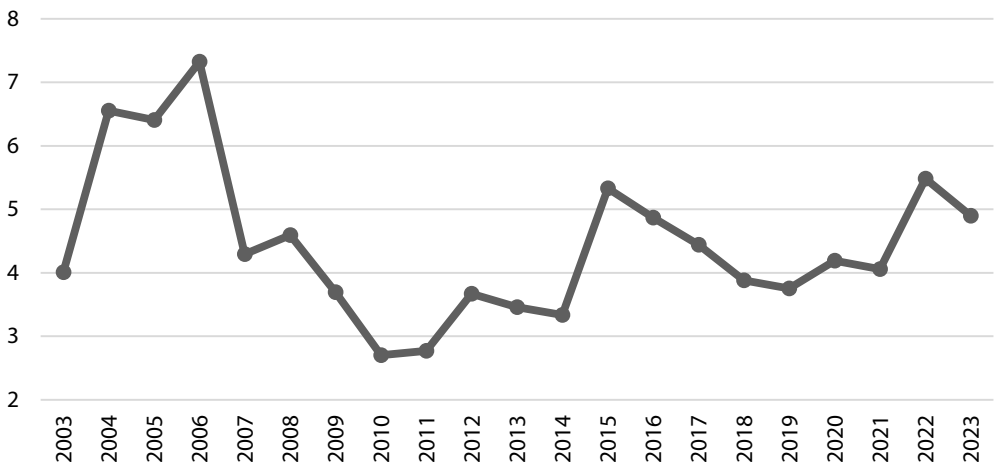



**Fig. 2.** *Dynamics of Nigeria's Government Expenditure on Health, % of Total Government Expenditure*
*Source: Author's Computations Using EXCEL*

allocated less than 6 %. Even with the commencement of the National Health Insurance Scheme (NHIS) in 2005, Nigeria still depended on international support because local funding remained low.

Figure 2 further shows that there was a steady increase in health spending between 2010 and 2015. This was made possible through the implementation of programs such as National Strategic Health Development Plan (NSHDP) for the period 2010–2015, launched to mobilize domestic resources, and SURE-P Health Program (2012), aimed at improving maternal and child health through savings from fuel subsidies. There was then a marked decline in health expenditure between 2015 and 2019 as Nigeria entered an economic recession in 2016 due to the fall in oil prices, which led to budget cuts in many sectors. A modest recovery is visible in 2019, reflecting the government's establishment of the Basic Health Care Provision Fund (BHCPF) around 2018 and renewed efforts to mobilize domestic resources in pursuit of Universal Health Coverage (UHC).

Figure 2 shows a sharp spike in government health spending around 2020, driven by the COVID-19 pandemic, which prompted the release of approximately 500 billion naira in emergency health funds under the Economic Sustainability Plan. The funds were used to build isolation and treatment centers, recruit health workers and provide them with hazard pay, and purchase testing, vaccination, and protective equipment. After 2020, expenditure slightly declined but stayed much higher than in the years before 2020. Following the implementation and initial results of the Nigeria COVID-19 Action Recovery and Economic Stimulus (NG-CARES) launched in 2020 government expenditure on health in Nigeria increased between 2021 and 2022, but declined again in 2023 due to a change in government.

### *3.2. Trends in GDP Growth and the Human Development Index in Nigeria*

Figure 3 demonstrates the dynamics of economic growth in Nigeria over the period under review. It shows that the growth rate was approximately 7.4 % in 2003, increased to approximately 9 % in 2004, and then declined to 6.4 % and 6.1 % in 2005 and 2006,

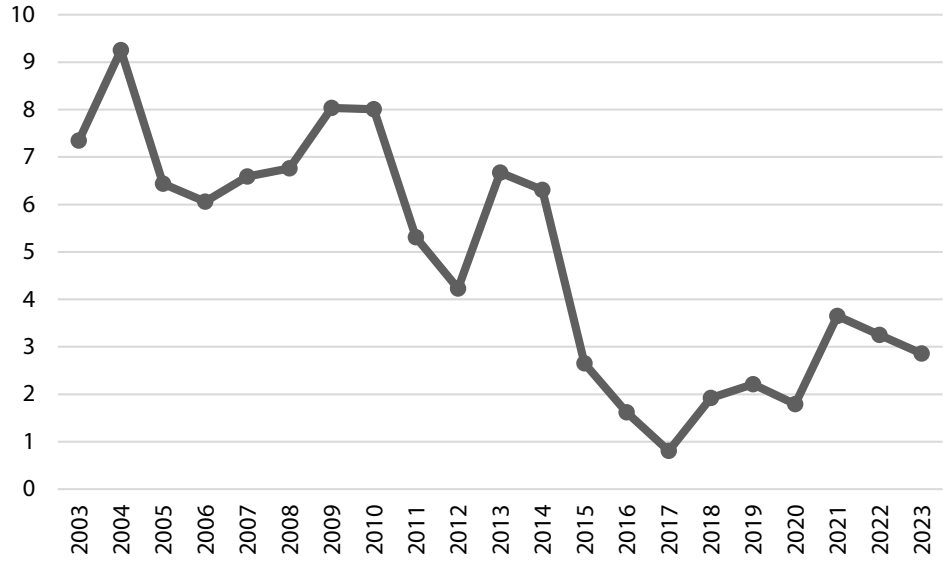



**Fig. 3.** *Dynamics of Nigeria's Real GDP Growth Rate*
*Source: Author's computations using EXCEL*

respectively. The economy then experienced a moderate recovery, with growth rates rising to nearly 8 % in 2009 and 2010. This was followed by a significant economic slowdown to 5.3 % and 4.2 % real GDP growth in 2011 and 2012, respectively. There was a new short-term upswing in 2013 and 2014, with growth rates increasing to approximately 6.7 % and 6.3 %, respectively.

In 2015, there was a noticeable decline in GDP growth, falling to around 2.7 %. It continued to decline, reaching a historic low of less than 1 % in 2017. This significant economic slowdown was caused by the Boko Haram insurgency in the north and the actions of Niger Delta militants in the south, who damaged oil pipelines (Awojobi, 2015). It was the largest economic downturn in the period studied, indicating significant economic difficulties and a reduction in productive activity.

Thereafter, economic activity experienced a modest recovery, with growth rates reaching around 1.9 % in 2018 and 2.2 % in 2019, before slowing again to around 1.8 % in 2020 because of the global COVID-19 pandemic. This period of economic decline led to a recession in Nigeria due to the fall in oil prices on the global market and lockdown measures that curbed economic activity (Adeniran & Sidiq, 2018). As lockdown measures gradually eased and global economic activity returned in 2021, Nigeria saw its growth rate gradually pick up to around 3.6 %, supported by rising oil prices and increased agricultural activity. However, this growth was short-lived, and the growth rate slowed to 3.3 % and 2.9 % in 2022 and 2023, respectively, due to policy inconsistency caused by the change of government.

Figure 4 displays the dynamics of the Human Development Index in Nigeria. The consistent improvement in the HDI over the period under study reflects gradual progress in education, health, and income levels, likely underpinned by policy interventions and improvements in social infrastructure. According to Barro and Lee (2013), improvements in literacy rates and skills needed in important sectors of the economy that drive economic sustainability result from increased investment in education. The steady increase in the

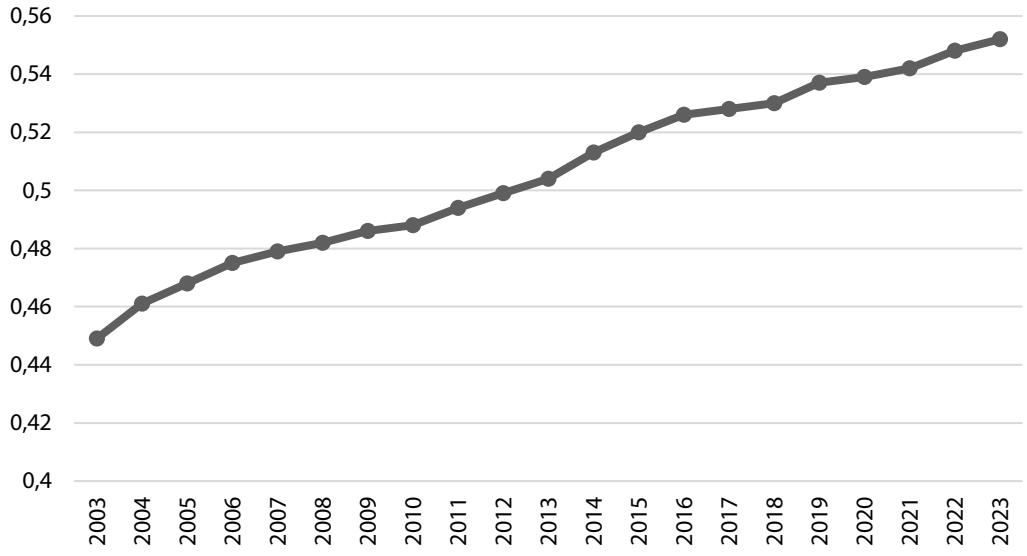



**Fig. 4.** *Dynamics of Nigeria's Human Development Index*
*Source: Author's Computations Using EXCEL*

Human Development Index over the years can be attributed to government policies aimed at good governance, social security and poverty reduction programs (Acemoglu & Robinson, 2012). For Nigeria to attain higher gross domestic product per capita, it is important to prioritize human capital development through continuous education, skill acquisition, and improved well-being of citizens (Todaro & Smith, 2020).

## 4. Data and Methods

The analysis used data from the World Bank archives for the period from 2003 to 2023, converted to quarterly data (a total of 83 observations). The following variables were included in the modeling: the growth rate of gross domestic product (GRGDP), measured in percentage, education expenditure (EE) as a percentage of GDP, health expenditure (HE) as a percentage of GDP, foreign direct investment (FDI) in billions of dollars, unemployment rate (UNEMP), and Human Development Index (HDI) as a product of life expectancy index, level of education and income.

The Augmented Dickey-Fuller test was used to verify the stationarity of variables while Autoregressive Distributed Lag (ARDL) model was used to determine the effect of human development on Nigeria's economic growth.

The estimation of short-term and long-term relationships was carried out using the ARDL model previously described by Awuna and Malkina (2026), with some modifications in the variables used, and specified as follows:

$$GRGDP_t = \alpha + \sum_{i=1}^{p}\beta_i GRGDP_{t-i} + \sum_{j=0}^{q}\gamma_j EE_{t-j} + \sum_{k=0}^{r}\delta_k HE_{t-k} + \sum_{l=0}^{s}\varnothing_l HDI_{t-l} + \\ + \sum_{m=0}^{u}\theta_m UNEMP_{t-m} + \sum_{n=0}^{w}\phi_n FDI_{t-n} + \varepsilon_t, \quad (1)$$

where:
$GRGDP_t$ is the growth rate of gross domestic product at time $t$;
$GRGDP_{t-i}$ is the growth rate of gross domestic product at time $t–i$, with lags up to $p$;
$EE_{t-j}$ signifies education expenditures at time $t–j$, with lags up to $q$;
$HE_{t-k}$ signifies healthcare expenditures at time $t–k$, with lags up to $r$;
$HDI_{t-l}$ is the Human Development Index at time $t–l$, with lags up to $s$;
$UNEMP_{t-m}$ represents the unemployment rate at time $t–m$, with lags up to $u$;
$FDI_{t-n}$ represents foreign direct investment at time $t–n$, with lags up to $w$;
$\alpha$ is a constant term;
$\beta_i$, $\gamma_j$, $\delta_k$, $\varnothing_l$, $\theta_m$, $\phi_n$ are coefficients;
$\varepsilon_t$ is the error term.

Note: test variables include education expenditure, healthcare expenditure and human development index, while control variables include unemployment rate and foreign direct investment.

## 5. Results and Discussion

### *5.1. Summary Statistics*

Table 1 shows the summary statistics for all stationary forms of the variables used in the model. The result shows that the variables of government expenditure on health, foreign direct investment and unemployment rate are positively right-skewed, implying the prevalence of values greater the sample mean. At the same time, the Human Development Index, GDP growth rate, and government spending

on education are negatively left-skewed, implying the prevalence of values less the sample mean. This is consistent with the findings of Ojima and Emerenini (2015), whose work also showed the predominance of values lower than the sample mean. This implies that there are some unusually large values in the dataset, even though most values may cluster below the mean.

The result further shows that all the variables are platykurtic with a kurtosis value lower than 3 except for government expenditure on health, implying that the distribution had a flatten curve in relation to the normal. The Jarque-Bera test for all variables except government expenditure on health shows no statistically significant difference at the 5 % level, which means that the data are likely to follow a normal distribution.

### *5.2. Unit Root Test*

Table 2 presents the results of the augmented Dickey-Fuller (ADF) test, which determines the stationarity level of a time series. According to these results, government expenditure on health is stationary at the time series level, while government expenditure on education, GDP growth rate, foreign direct investment, the Human Development Index and unemployment rate are stationary at the first difference.

Table 1

**Descriptive Statistics for Model Variables**

| | GRGDP | HDI | HEE | EE | FDI | UNEMP |
|---|---|---|---|---|---|---|
| Mean | 3.710 | 0.503 | 170.998 | 7.517 | 4190.000 | 4.134 |
| Median | 4.050 | 0.502 | 162.458 | 7.200 | 3450.000 | 3.795 |
| Maximum | 5.740 | 0.548 | 220.443 | 13.000 | 8840.000 | 5.742 |
| Minimum | 1.050 | 0.449 | 154.802 | 1.690 | –187.000 | 3.074 |
| Std. Dev. | 1.270 | 0.030 | 17.189 | 2.830 | 2590.000 | 0.708 |
| Skewness | –0.643 | –0.123 | 1.392 | –0.275 | 0.315 | 0.996 |
| Kurtosis | 2.603 | 1.832 | 4.517 | 2.905 | 2.111 | 2.850 |
| Jarque-Bera | 1.585 | 1.186 | 7.958 | 0.272 | 1.039 | 3.493 |
| Probability | 0.453 | 0.553 | 0.019 | 0.873 | 0.595 | 0.174 |
| Sum | 7.790 | 10.068 | 3248.970 | 157.860 | 8.810 | 86.810 |
| Sum Sq. Dev. | 3.210 | 0.017 | 5318.484 | 160.204 | 1.340 | 10.015 |

Source: Authors' computations using EVIEWS 12.

Table 2

**Results of Time Series Testing for Stationarity**

| | Stationary at Level | | | | Stationary at First Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | ADF | 1 % | 5 % | 10 % | ADF | 1 % | 5 % | 10 % | Inf. |
| EE | — | — | — | — | –2.958*** | –3.516 | –2.899 | –2.587 | I (1) |
| FDI | — | — | — | — | –3.441*** | –3.520 | –2.901 | –2.588 | I (1) |
| GRGDP | — | — | — | — | –3.441*** | –3.520 | –2.901 | –2.588 | I (1) |
| HDI | — | — | — | — | –3.366*** | –3.516 | –2.898 | –2.587 | I (1) |
| HE | –2.912*** | –3.520 | –2.901 | –2.588 | — | — | — | — | I (0) |
| UNEMP | — | — | — | — | –6.616*** | –3.526 | –2.903 | –2.589 | I (1) |

Note. ***Indicates significance at 1 %.
Source: Authors' computations using EVIEWS 12.

### *5.3. Lag Selection*

When dealing with the Autoregressive Distributed Lag (ARDL) model, it is important to select the appropriate lag for the model. This helps to eliminate serial correlation in residuals which can lead to bias results. Since the dataset were transformed to quarterly data, lag length of four (4) was initially considered so as to adequately accommodate quarterly dynamic adjustments and delayed effect among variables. However, the information criteria — AIC, SC, and HQ — consistently selected lag 2 as the optimal specification, minimizing information loss while maintaining model parsimony and avoiding overparameterization. Hence, lag 2 was chosen for final ARDL estimation (Table 3).

### *5.4. Test for Cointegration Using Autoregressive Distributed Lag Bounds*

The Bounds test is an essential tool for assessing cointegration among variables in time series analysis. It is particularly appropriate when the variables have mixed orders of integration, that is, both I(0) and I(1) together as shown in Table 4. As can be seen from the table, at 5 % level of significance, the F-statistic value (4.41) is higher than the value of the upper (3.38) and lower (2.39) bounds at the 5 % level, therefore, we reject the null hypothesis that there is no cointegration equation.

### *5.5. Multicollinearity Test*

The results presented in Table 5 below show the absence of multicollinearity in the model, as evidenced by the Centered Variance Inflation Factors being less than 10. This shows the reliability and stability of the regression estimates.

Table 3

**Lag Selection Criteria**

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | –289.7476 | NA | 7.19e–05 | 7.487280 | 7.667238 | 7.559311 |
| 1 | 656.7182 | 1725.2030 | 7.04e–15 | –15.562490 | –14.302780 | –15.057810 |
| 2 | 883.7957 | 295.8765* | 2.01e–16* | –19.134070* | –16.794610* | –18.196810* |

Note: *Denotes the lag length chosen by the respective information criterion. LR represents the sequentially modified likelihood ratio test statistic, at 5 % level of significance. FPE refers to the final prediction error, while AIC, SC, and HQ denote the Akaike Information Criterion, the Schwarz Information Criterion, and the Hannan-Quinn Information Criterion, respectively.

Source: Authors' computations using EVIEWS 12.

Table 4

**ARDL Bounds Test**

| Test Statistic | Value | Number of Regressors |
|---|---|---|
| F-statistic | 4.412495 | 5 |
| Critical Value Bounds | | |
| **Significance** | **I0 Bound** | **I1 Bound** |
| 10.0 % | 2.08 | 3.00 |
| 5.0 % | 2.39 | 3.38 |
| 2.5 % | 2.70 | 3.73 |
| 1.0 % | 3.06 | 4.15 |

Source: Authors' computations using EVIEWS 12.

Table 5

**Result of Multicollinearity Test**

| Variable | Coefficient Variance | Uncentered VIF | Centered VIF |
|---|---|---|---|
| **C** | 46.938850 | 2200.26100 | NA |
| **HDI** | 135.398300 | 1629.65500 | 5.240629 |
| **FDI** | 0.144661 | 16.21115 | 4.606352 |
| **EE** | 0.016097 | 32.82299 | 1.408489 |
| **HEE** | 0.024879 | 24.66208 | 1.438265 |
| **UNEMP** | 0.086598 | 72.10710 | 1.776234 |

Source: Authors' computations using EVIEWS 12.

### *5.6. The Impact of Human Development on Economic Growth*

Table 6 presents the results of the ARDL cointegration model. According to the results, the error correction term (–0.578) is statistically significant at 1 % and this indicates strong cointegration. This implies that approximately 57.8 % of any imbalance is corrected in each period, indicating a high speed of equilibrium recovery. The results also show that government expenditures on education have a positive (coefficient of 1.421) and significant effect on economic growth. This indicates that education improves the skills of the workforce in productive sectors such as agriculture and manufacturing, which in turn leads to higher productivity. This result is supported by Nwuzor et al. (2025) and Odetola et al. (2025), who also showed that public spending on education plays a significant role in stimulating economic growth.

Similarly, government expenditure on health has a positive (coefficient of 0.5881) and significant (at the 1 % level) short-run effect on economic growth. This suggests that increased health spending contributes to economic growth by increasing productivity and labor efficiency. This result is consistent with the findings of Kuzior et al. (2025). Furthermore, according to Table 6, unemployment has a negative impact (with a coefficient of –1.783) on economic growth in the short run, which is explained by the fact that unemployment reduces household income. This result is in line with Polat (2025) and Ngcobo et al. (2025), who also found that economic growth is negatively impacted by unemployment.

Finally, in the short-run, the Human Development Index (with a coefficient of 17.485) positively impacts economic growth. The result aligns with those of Magida et al. (2025), Mburamatare et al. (2025), Puttitanun and Lerskullawat (2025), who also found HDI pivotal to Nigeria's economic growth. These results are consistent with the theory that improvements in living standards generate short-run growth outcomes.

In the long run, only the Human Development Index (with a coefficient of 98.151) is significant at 1 %, indicating that only a holistic improvement of human capital can lead to economic expansion over time. This conforms with the results of Wasahua et al. (2025).

### *5.7. Diagnostic Tests*

To confirm reliability of the model, the following diagnostic were conducted (see Table 7). The results reveal the absence of serial correlation and heteroscedasticity. They also show that the residuals are normally distributed and the model is correctly specified with no omitted variable bias. The CUSUM and CUSUM of Squares tests presented in Figure 5 show that the estimated coefficients are stable since the fall between the 5 % significance thresholds.

Table 6

**Autoregressive Distributed Lag (ARDL) Results**

| Cointegrating Form | | | | |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **ΔGRGDP** | 0.684 | 0.066 | 10.300 | 0.0000 |
| **ΔHDI** | 17.485 | 5.374 | 3.254 | 0.0018 |
| **ΔEE** | 1.421 | 0.316 | 4.498 | 0.0000 |
| **ΔHEE** | 0.588 | 0.207 | 2.840 | 0.0060 |
| **ΔFDI** | 1.042 | 0.422 | 2.469 | 0.0162 |
| **ΔUNEMP** | –1.783 | 0.433 | –4.122 | 0.0001 |
| **CointEq(–1)** | –0.578 | 0.031 | –5.812 | 0.0000 |
| **Long Run Coefficients** | | | | |
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **HDI** | 98.151000 | 25.255000 | 3.887000 | 0.0002 |
| **EE** | 0.090000 | 0.249000 | 0.363000 | 0.7181 |
| **HEE** | 0.445000 | 0.305000 | 1.456000 | 0.1503 |
| **FDI** | 0.462407 | 0.736234 | 0.628071 | 0.5322 |
| **UNEMP** | –0.218588 | 0.607215 | –0.359985 | 0.7200 |
| **C** | 44.230796 | 4.054723 | 10.908464 | 0.0001 |

Source: Authors' computations using EVIEWS 12.

Table 7

**Results of Diagnostic Tests**

| Diagnostic Test | p Value | Decision |
|---|---|---|
| Breusch Godfrey LM test for serial correlation | 0.1964 | Serial correlation absent |
| Breusch Pagan Godfrey test for heteroscedasticity | 0.4207 | No heteroscedasticity |
| Ramsey RESET test | 0.5230 | Model is specified correctly |
| Jarque Bera Test for normality | 0.2350 | Residuals are normally distributed |

Source: Authors' work using EVIEWS 12.

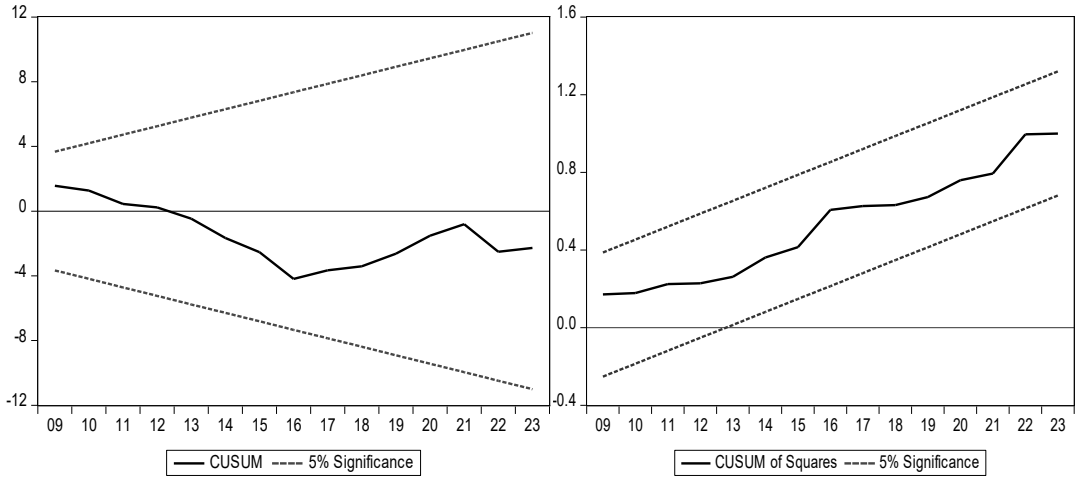



**Fig. 5.** *CUSUM and CUSUM of Squares Tests*
*Source: Authors' computations using EVIEWS 12.*

## 6. Conclusion

The study examined the impact of human development on Nigeria's economic growth from 2003 to 2023. The results show that in the short term, Nigeria's economic growth is impacted positively by education expenditure, health expenditure and human development index while unemployment negatively impacts growth. These outcomes emphasize that, to improve efficiency and achieve overall growth, government needs to raise spending on education and health sectors. The study also concludes that achieving long-term economic growth requires joint and synergistic improvements in education, health, and living standards, which are components of the Human Development Index.

The research findings lead to the following policy recommendations which must be taken together practically to achieve desired outcomes. First of all, annual public spending on education and healthcare in Nigeria should be increased to 4–6 % of GDP which stands within the globally accepted UNESCO margin, so as to harness the potentials of these sectors towards economic development. In addition, special attention should be paid not only to the amount of social spending but also to the effective utilization of public spending and monitoring of their use, preventing misuse of funds. This institutional control will prevent leakages and redirect funds appropriately. Furthermore, as a means of boosting labor force for increased productivity, the Federal Ministry of Labor and Employment should create more jobs in productive sectors such as agriculture, manufacturing, and tourism so as to cushion the negative impact of unemployment on economic growth.

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*Дата поступления рукописи: 09.04.2026.*
*Прошла рецензирование: 17.04.2026.*
*Принято решение о публикации: 30.04. 2026.*
*Received: 09 Apr 2026.*
*Reviewed: 17 Apr 2026.*
*Accepted: 30 Apr 2026.*