



## Socioeconomic Determinants of Income Inequality in Nigeria and Their Implications for Economic Growth

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Article Info	ABSTRACT
<p><b>Corresponding Author</b> Vivian C. Onyejebu Email: onwuelovian@gmail.com</p>	<p>The persistent challenge of income inequality and uneven growth in Nigeria continues to hinder sustainable development efforts. The study examined the determinants of income inequality and economic growth in Nigeria (1994–2023) was conducted to (i) examine the impact of access to education, healthcare, and unemployment on income inequality on economic growth in Nigeria. The study employed the Autoregressive Distributed Lag (ARDL) model with the Fully Modified Ordinary Least Squares (FMOLS) as a robustness check after conducting necessary diagnostic tests. The core variables include income inequality, economic growth, secondary school enrolment, life expectancy, maternal mortality rate, unemployment, government recurrent education and health expenditures, institutional quality index, FDI, inflation, oil price, and trade openness. Findings from the first model show that secondary school enrolment significantly increased income inequality (0.3394; <math>p &lt; 0.05</math>), while life expectancy reduced it (-3.5144; <math>p &lt; 0.01</math>); unemployment had a negative and significant impact (-12.9941; <math>p &lt; 0.01</math>), implying that improved employment and healthcare reduce inequality in the long run. However, they all have a significant impact, with only unemployment having a negative impact. Furthermore, in the short run, only FDI enhances growth, whereas inflation and the institutional quality index are the only two factors that constrain growth. Based on these results, the study recommends enhanced investment in quality education and healthcare, job creation through fiscal decentralization, and institutional reforms to stabilize inflation and attract productive FDI. Furthermore, progressive taxation and social protection mechanisms are advocated to promote inclusive and equitable growth. Overall, the study concludes that reducing structural inequalities through human capital development and strong institutional frameworks is indispensable for achieving sustainable economic growth in Nigeria.</p> <p><b>Keywords:</b> Education, healthcare, and unemployment on income inequality, economic growth</p>

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### INTRODUCTION

Global patterns reveal a widening tension between economic growth and within-country inequality, but global inequality between countries has moderated in recent

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decades. Income and wealth concentration inside many nations, especially middle- and low-income countries, has risen, undermining inclusive development (Alvaredo, Chancel, Piketty, Saez & Zucman, 2022; World Bank, 2025). Increasing income inequality in all its forms everywhere is the top priority and main concern of the United Nations Sustainable Development Goals (Jomehpour, 2017). Though sensible and functional efforts have been instigated to accomplish the Sustainable Development Goals (SDGs) for the reduction of income inequality, nevertheless, in the majority of developing countries, the rate of income inequality is still high. However, finding the solutions to reduce income inequality is a complex and challenging issue for developed as well as developing countries. In Africa, income disparity extends beyond economic inequities. Its causes and effects have been linked to social unrest, political instability, and hampered economic growth (Adenikinju, 2017).

Historically, income disparity in Sub-Saharan Africa has been significantly impacted by the legacy of colonialism. Natural resources and labor were exploited during the colonial era, which led to the concentration of wealth in the hands of local elites and colonial powers. Oladapo et al (2024) claim that this unequal allocation of resources set the stage for long-lasting differences in wealth and income in the area. This, according to Maduka and Anyanwu (2024), may be traced to the predominance of extractive industries and agriculture as primary sources of economic activity; thus, limiting the diversification of economies and hindering the creation of high-quality employment opportunities to checkmate poverty and inequality in Nigeria is not left out.

Nigeria's recent growth story has been deeply uneven: after a fragile post-pandemic recovery, real GDP growth slowed to the mid-single digits while inflation and living-cost shocks have eroded household welfare, producing one of the world's most acute income-and-wealth gaps (Central Bank of Nigeria, 2024; World Bank, 2024). Empirical research and civil-society analyses point to multiple, interacting determinants driving Nigeria's inequality (constrained job creation and a large informal sector, skewed access to education and electricity, weak redistributive tax and public-service provision, volatile external revenues (oil and debt), and mixed institutional quality) all of which shape how growth translates (or fails to translate) into broadly shared prosperity (Odozi, 2023; World Inequality Lab, 2022). Oxfam (2023) asserts that the richest 0.003 percent of Nigerians (6,355 people with \$5 million or more) had 1.4 times the wealth of the country's 107 million other citizens, making the affluent richer and the poor poorer since the COVID-19 pandemic. Although the underlying causes may differ, governments often view a more equitable income distribution as a desirable objective. Many people believe that lowering income disparity is necessary to provide opportunities for equal access to economic, social, and political resources. Conversely, some consider it inherently negative since the current income disparities are seen as resulting from inequitable access to resources, which can harm social unity (Sharimakin, Oseni, & Adegboye, 2015).

Rapid urbanization, unequal access to high-quality healthcare and education, and disparities in employment opportunities across different economic sectors have contributed significantly to rising income inequality in Nigeria (Gado, 2025; Onwujekwe et al., 2021; Aliyu & Amadu, 2017). The unequal distribution of wealth and resources is one of the main causes of income inequality in Nigeria. The developed economies have experienced a significant boost in income compared to the less developed countries have struggled to

achieve similar levels of prosperity, resulting in widening income gaps between urban and rural populations.

As identified by Adesina (2013), high levels of unemployment can lead to a situation where a significant portion of Nigerians will not have access to stable sources of income. This lack of income stability can exacerbate income inequality as those who are unemployed or underemployed struggle to meet their basic needs (International Institute of Academic Research and Development, 2024; Michael, 2024). Equally, disparities in educational opportunities in Nigeria can perpetuate existing inequalities by limiting Nigerians' ability to secure well-paying jobs or access higher education. Without equal access to education, individuals from disadvantaged backgrounds face barriers to upward mobility and are more likely to remain trapped in low-income cycles.

Limited access to quality healthcare services can result in increased healthcare costs for Nigerians, pushing them further into poverty. Health disparities based on socio-economic status can lead to unequal health outcomes, impacting Nigerians' ability to work and earn a stable income. Moreover, the inadequate access to affordable healthcare options can force individuals to prioritize medical expenses over other essential needs, perpetuating the cycle of poverty and income inequality. This trend of inequality may worsen the economic condition of Nigeria. This was noted that one of the key ways income inequality affects economic growth is through its impact on aggregate demand (Agbatogun & Sodiq, 2025). As income becomes more concentrated in the hands of a few wealthy individuals or households, the overall level of spending in the economy may decrease. This is because higher-income individuals tend to save a larger portion of their income rather than spend it. As a result, there is less consumption and lower demand for goods and services, which can slow down economic growth.

The relationship between the two macroeconomic conditions is multidimensional and context-specific, shaped by structural, demographic, and institutional factors. Persistent inequality undermines growth. The combined effects of disparities tied to birthplace, ethnicity, and parental background, with the already mentioned factors, limit human capital development and perpetuate poverty (World Bank, 2024). In Nigeria, poor households spend disproportionately more on healthcare than wealthier groups, further straining already underfunded systems (Dejusticia, 2024). Empirical evidence shows that a 1% rise in inequality reduces GDP growth in Sub-Saharan Africa by 0.31- 0.47%, highlighting its direct negative impact on economic growth (Ahmad Bello, Hassan, & Akadir, 2025). Similarly, human capital gains alone may worsen inequality without complementary improvements in governance, such as corruption control and institutional effectiveness (Nunoo, Taale, Ofori, & Mwinlaaru, 2024).

Following the lingering problems surrounding Nigeria's economy, addressing income inequality requires comprehensive policy interventions aimed at creating opportunities for sustainable livelihoods across all segments of Nigerian society. By implementing targeted measures to reduce disparities in income distribution and enhance social mobility, Nigeria can work towards building a more equitable and prosperous society for all its citizens. This study is therefore put forward to evaluate the actual determinants of income inequality in Nigeria to assess how it has affected the growth of Nigeria's economy.

### **Research Questions**

The research questions that the study sought to address are:

1. What is the effect of access to education on income inequality in Nigeria?

2. What is the effect of access to healthcare on income inequality in Nigeria?
3. What is the effect of unemployment on income inequality in Nigeria?

### **Research Hypotheses**

The following null hypotheses are stated to guide the study:

- 1  $H_{01}$ : Access to education does not significantly affect income inequality in Nigeria.
- 2  $H_{02}$ : Access to healthcare does not significantly affect income inequality in Nigeria,
- 3  $H_{03}$ : Unemployment does not significantly affect income inequality in Nigeria.

## **METHODOLOGY**

### **Theoretical Framework**

The theoretical foundation of this research will be the Kuznets Theory of Inequality. This theory holds that as an economy grows, market forces cause economic disparity to first rise and subsequently fall. Based on his observations of historical data on income disparity and economic progress in many nations, Kuznets formulated this idea. He discovered that when a nation's economy expands during the early phases of industrialization, income disparity typically rises as well. The factors that led to this early increase in inequality include migration from rural to urban areas, technical developments that favoured skilled labour, and the concentration of wealth in specific industries or regions.

As the economy continues to develop, Kuznets argued that income inequality would eventually reach a peak and then decline. This decline is theorized to occur due to various factors associated with advanced industrialization and modernization, including increased education and skill levels among the population, the spread of more equitable employment opportunities, and government interventions through social welfare programs and progressive taxation. This can be functionally given as:

$$Y = f(X_1, X_2, X_3, \dots) \quad (1)$$

where:

Y = Income inequality

$X_1$  = Education

$X_2$  = Population

$X_3$  = Employment opportunities, and so on.

The connection between the theory and the model used in this study lies in how the Kuznets Theory of Inequality provides the conceptual foundation for the autoregressive distributed lag (ARDL) model applied. The Kuznets theory posits that income inequality initially rises and later falls as an economy develops, implying a dynamic, time-dependent relationship between growth and inequality. The ARDL model aligns with this theoretical view by capturing both short-run and long-run effects among variables such as education, healthcare, unemployment, and economic growth. Thus, while the Kuznets theory explains the non-linear, transitional nature of inequality, the ARDL model empirically tests this relationship within Nigeria's economic context over time.

### **Model specification**

This section presents and discusses macro-econometric models consisting of equations that are used to address the various research objectives that have been specified in Chapter One. These models were built after adjusting the Kuznets theory of inequality to suit the objectives of this study while adopting other control variables. The major independent variables in this study include education, healthcare, unemployment, income inequality, and economic growth. Additionally, this study incorporates other control

variables. To capture all the objectives, this study employs the Auto Regressive Distributed Lag (ARDL) bounds testing approach because of its dynamism. However, the Fully Modified Ordinary Least Squares (FMOLS) technique is used for a robustness check of the formal method.

Objective 1 examines the effect of access to education on income inequality, Objective 2 examines the effect of healthcare on income inequality, and Objective 3 investigates the effect of unemployment on income inequality in Nigeria. To achieve these objectives, the study specified the functional form as follows;

$$GINI = F(SSRT, GREE, LER, MMR, UNEP, CPS, FDI, INSQX) \quad (2)$$

For empirical computation equation (2) is transformed into a mathematical form as given below:

$$GINI = \alpha_0 + \beta_1 SSRT + \beta_2 GREE + \beta_3 LER + \beta_4 MMR + \beta_5 UNEP + \beta_6 CPS + \beta_7 FDI + \beta_8 INSQX \quad (3)$$

For econometric analysis, equation (3) is specified adopting the generalized form of the ARDL model:

$$\begin{aligned} GINI_t = & \alpha_0 + \sum_{j=1}^{\rho} \gamma_j GINI_{t-j} + \sum_{i=0}^{\lambda} \theta_i SSRT_{t-i} + \sum_{k=0}^{\lambda} \lambda_k GREE_{t-k} + \sum_{m=0}^{\lambda} \delta_m LER_{t-m} \\ & + \sum_{s=0}^{\lambda} \rho_s MMR_{t-s} + \sum_{q=0}^{\lambda} \phi_q UNEP_{t-q} + \sum_{h=0}^{\lambda} \partial_h CPS_{t-h} + \sum_{l=0}^{\lambda} \vartheta_l FDI_{t-l} \\ & + \sum_{x=0}^{\lambda} \varphi_x INSQX_{t-x} + \pi_t \end{aligned} \quad (4)$$

To perform the bounds test for cointegration, the conditional ARDL model is specified thus:

$$\begin{aligned} \Delta GINI_t = & \alpha_0 + \beta_j GINI_{t-j} + \phi_i SSRT_{t-i} + \Omega_k GREE_{t-k} + \psi_m LER_{t-m} + \wp_s MMR_{t-s} \\ & + \omega_q UNEP_{t-q} + \infty_h CPS_{t-h} + \bar{m}_l FDI_{t-l} + \eta_x PINSQX_{t-x} + \sum_{j=1}^{\rho} \gamma_j \Delta GINI_{t-j} \\ & + \sum_{i=0}^{\lambda} \theta_i \Delta SSRT_{t-i} + \sum_{k=0}^{\lambda} \lambda_k \Delta GREE_{t-k} + \sum_{m=0}^{\lambda} \delta_m \Delta LER_{t-m} + \sum_{s=0}^{\lambda} \rho_s \Delta MMR_{t-s} \\ & + \sum_{q=0}^{\lambda} \phi_q \Delta UNEP_{t-q} + \sum_{h=0}^{\lambda} \partial_h \Delta CPS_{t-h} + \sum_{l=0}^{\lambda} \vartheta_l \Delta FDI_{t-l} + \sum_{x=0}^{\lambda} \varphi_x \Delta INSQX_{t-x} \\ & + \pi_t \end{aligned} \quad (5)$$

The hypotheses for the bounds test indicate that the coefficients in the long-run equation are all equal to zero, in contrast to the alternative that they are not equal to zero, are stated below:

$$H_0 : \beta_j = \phi_i = \Omega_k = \pi_m = \psi_m = \wp_s = \omega_q = \infty_h = \bar{m}_l = \eta_x = 0$$

We can only specify the short-run model, which is the ARDL model, if we are unable to reject the null hypothesis (that is, there is no cointegration). The ARDL model is specified thus:

$$\begin{aligned} \Delta GINI_t = & \alpha_0 + \sum_{j=1}^{\rho} \gamma_j \Delta GINI_{t-j} + \sum_{i=0}^{\lambda} \theta_i \Delta SSRT_{t-i} + \sum_{k=0}^{\lambda} \lambda_k \Delta GREE_{t-k} + \sum_{m=0}^{\lambda} \delta_m \Delta LER_{t-m} \\ & + \sum_{s=0}^{\lambda} \rho_s \Delta MMR_{t-s} + \sum_{q=0}^{\lambda} \phi_q \Delta UNEP_{t-q} + \sum_{h=0}^{\lambda} \partial_h \Delta CPS_{t-h} + \sum_{l=0}^{\lambda} \vartheta_l \Delta FDI_{t-l} \\ & + \sum_{x=0}^{\lambda} \varphi_x \Delta INSQX_{t-x} + \pi_t \end{aligned} \quad (6)$$

We can specify both the short-run and long-run model, which is the error correction model (ECM), if we can reject the null hypothesis (that is, there is cointegration). The error correction model (ECM) representation is specified as;

$$\begin{aligned} \Delta GINI_t = & \alpha_0 + \sum_{j=1}^{\rho} \gamma_j \Delta GINI_{t-j} + \sum_{i=0}^{\lambda} \theta_i \Delta SSRT_{t-i} + \sum_{k=0}^{\lambda} \lambda_k \Delta GREE_{t-k} + \sum_{m=0}^{\lambda} \delta_m \Delta LER_{t-m} \\ & + \sum_{s=0}^{\lambda} \rho_s \Delta MMR_{t-s} + \sum_{q=0}^{\lambda} \phi_q \Delta UNEP_{t-q} + \sum_{h=0}^{\lambda} \partial_h \Delta CPS_{t-h} + \sum_{l=0}^{\lambda} \vartheta_l \Delta FDI_{t-l} \\ & + \sum_{x=0}^{\lambda} \varphi_x \Delta INSQX_{t-x} + \xi ECT_{t-i} \\ & + \pi_t \end{aligned} \quad (7)$$

where GINI = Gini coefficient, SSRT = secondary school enrollment, GREE= government recurrent expenditure on education, LER= life expectancy rate, MMR = maternal mortality rate, UNEP = unemployment rate, CPS = monetary sector credit to the private sector, FDI = foreign direct investment, INSQX = institutional quality index.

### Explanation and Justification of Variables

The model incorporates key macroeconomic and social variables to explain economic growth and inequality dynamics. The Gross Domestic Product (GDP) growth rate captures overall economic performance by measuring annual increases in output at constant prices. Income inequality reflects disparities in income distribution, commonly assessed using indicators such as the Gini coefficient, and highlights differences in access to opportunities. Life expectancy at birth represents population health outcomes, while foreign direct investment (FDI) measures external capital inflows that support economic activities. Unemployment indicates labor market conditions, and secondary school enrollment reflects human capital development through education access. Government recurrent expenditure on education and health captures public investment in essential services, while monetary sector credit to the private sector represents financial support for business activities and economic expansion. The maternal mortality ratio serves as an indicator of healthcare quality and women's well-being. Population growth rate is used as a proxy for labor force expansion, consistent with growth theories, while trade openness measures integration into the global economy through imports and exports. Institutional quality index evaluates governance effectiveness and policy implementation. Finally, interaction effects are included to assess how institutional quality moderates the relationships among economic growth, inequality, and other explanatory variables.

### Justification of Estimation Technique

The Autoregressive Distributed Lag (ARDL) model is employed in this study due to its flexibility and dynamic capabilities in time-series analysis. Unlike static models, ARDL

incorporates both current and lagged values of dependent and explanatory variables, enabling a comprehensive examination of short- and long-run relationships. It also allows the inclusion of both endogenous and exogenous variables, making it more suitable than models like VAR, which focus only on endogenous interactions. ARDL is particularly useful where traditional approaches such as the Engle and Granger two-step method fail, especially due to issues like autocorrelation and endogeneity arising from co-movement of variables. Another advantage of ARDL is its ability to handle variables with mixed orders of integration, specifically  $I(0)$  and  $I(1)$ , without producing spurious results. It is also effective with small sample sizes and allows different lag lengths for variables, enhancing model flexibility while maintaining parsimony. This ensures a simpler yet robust model specification. To strengthen the reliability of results, Fully Modified Ordinary Least Squares (FMOLS) is used as a robustness check. FMOLS corrects for serial correlation and endogeneity biases in cointegrated systems, providing consistent and efficient long-run estimates. By combining ARDL with FMOLS, the study ensures more credible and stable empirical findings.

### **Evaluation Procedure**

The study conducted a series of pre-estimation and post-estimation tests to ensure the reliability and validity of the data analysis. Descriptive statistics were first employed to summarize the dataset, using measures of central tendency such as mean and median, alongside measures of dispersion like variance and standard deviation, to provide a clear understanding of data characteristics. The Augmented Dickey-Fuller (ADF) test was then applied to examine stationarity, ensuring that variables were not non-stationary or integrated beyond order one, thereby avoiding spurious results. To address potential multicollinearity, a correlation matrix was used to assess the relationships among independent variables, with high correlations indicating possible estimation issues. Co-integration tests were also performed to determine the existence of long-run relationships among variables, with significance evaluated using trace and Max-Eigen statistics. Following estimation, diagnostic tests were conducted. The Breusch-Godfrey test was used to detect autocorrelation, ensuring that error terms were independent. The Breusch-Pagan-Godfrey test assessed heteroskedasticity, confirming whether error variances remained constant. Lastly, model stability was evaluated using CUSUM and CUSUMSQ tests, where results indicated stability if residuals remained within critical bounds. These procedures ensured robust and dependable empirical findings.

### **Econometric Software Package**

The study utilized secondary time-series data covering the period from 1994 to 2023. Data for the variables were obtained from multiple reliable sources based on their relevance. Economic growth was proxied by real GDP growth at constant 2015 prices, while healthcare was measured using life expectancy at birth and maternal mortality ratio. Income inequality was represented by the Gini coefficient, and unemployment was measured as a percentage of the total labour force. Education was captured through secondary school enrollment rates. Government recurrent expenditure on health and education was sourced from the Central Bank of Nigeria, while foreign direct investment, population growth, and credit to the private sector were obtained from the World Bank. Crude oil prices were sourced from the International Monetary Fund, and institutional quality was measured using World Governance Indicators. Additionally, the study employed E-Views 10 software for

data analysis due to its user-friendly nature and ability to handle the required econometric estimations effectively.

## RESULTS

### Data Presentation and Analyses

This study analyzed three models and all the variables used as presented in the models are education (proxied with secondary school enrolment (SSRT)), healthcare (proxy with life expectancy at birth (LER) and maternal mortality ratio (MMR)), and unemployment as % of the total labour force (UNEP), real gross domestic product growth (GDPG), and income inequality (proxied by Gini co-efficient (GINI)). Foreign direct investment (FDI), inflation rate (INFL), real exchange rate (RER), government recurrent expenditure (proxy with government recurrent expenditure on health (GREH) and education (GREE)), population growth (POPG), trade openness (proxy with total merchandise (TRD)), crude oil price (OILP), monetary sector credit to private sector (CPS), and institutional quality index (proxy with the six indicators) are additional variables included in the models. Regression estimate using the autoregressive distributed lag for the three models was conducted after the pre-estimation test (descriptive statistics, multi-collinearity, and the unit root test) was completed.

### Correlation Analysis

Before the estimation is done, the degree of multicollinearity between the series can be assessed using the ordinary correlation matrix. This only demonstrates that the series does not exhibit multicollinearity. For each of the models estimated in this study, the correlation matrix is displayed in the table 1.

**Table 1:** Correlation Matrix of the Variables

VARIABLES	GINI	SSRT	GREE	LER	MMR	UNEP	CPS	FDI	INSQX
GINI	1.000000								
	-								
SSRT	0.591218	1.000000							
	-	-							
GREE	0.611832	0.677781	1.000000						
	-	-	-						
LER	0.633256	0.750169	0.788082	1.000000					
MMR	0.325999	0.054077	0.057788	0.070878	1.000000				
	-	-	-	-	-				
UNEP	0.320223	0.207023	0.433535	0.299085	0.056167	1.000000			
	-	-	-	-	-	-			
CPS	0.347583	0.581991	0.476853	0.684883	0.127867	0.050859	1.000000		
	-	-	-	-	-	-	-		
FDI	0.066144	0.247750	0.464558	0.176975	0.292820	0.410012	0.184503	1.000000	
	-	-	-	-	-	-	-	-	
INSQX	0.395889	0.730038	0.668824	0.829574	0.202247	0.343222	0.741975	0.077394	1.000000

### Test for Lag Length Selection (Models One, Two, and Three)

The lag length criteria test was determined using Akaike's Information Criterion (AIC) to determine the ideal lag length of the ARDL model in order to perform a valid ARDL model analysis. The major regression outputs for each model show that the best lag durations were chosen automatically during the analysis using E-View as the estimation program.

### Co-integration Test

To determine whether or not a group of non-stationary time series variables has a long-run equilibrium connection, a cointegration test is performed. Since the unit root test indicates that the variables are stationary at both levels and first order, the ARDL F-Bound test was employed in this investigation. Given the null hypothesis:

$$H_0 = \beta_0 = \beta_1 = \dots = \beta_n = 0 \text{ (no cointegration among the variables)}$$

Decision rule:

Case 1: Reject  $H_0$  if the F-value is greater than the upper bound

Case 3: Inconclusive if the F-value falls between the lower and upper bounds.

**Table 2:** Bounds Test Result for Objective One

Test Statistic	Value	K (Number of Regressors)	Significance Level	I(0) Bound	I(1) Bound
F-Statistic	5.013259	8	10%	1.85	2.85
			5%	2.11	3.15
			2.5%	2.33	3.42
			1%	2.62	3.77

Source: Author's Computation using E-Views 10

Decision Rule: We reject the null hypothesis since the test statistic (F-statistic = 5.013259) is greater than the upper bounds at a 5% level of significance [I(1) Bound = 3.15], and consequently conclude that a long-run relationship exists in the model. This test verifies if there exist long-run relationships among the related variables of interest.

### Estimation and Interpretation of Regression Results

Since it has been determined to have a long-term relationship, as shown in summary table 4, the study uses the ARDL estimate technique for objective 1 in order to accomplish its specific goal, which is to examine the impact of access to education, healthcare, and unemployment on income inequality in Nigeria. The model estimated the long-run coefficients is summarized Table 3 is presented below.

**Table 3:** Long-Run Estimation Result

Dependent Variable: *G/N/I*

Variables	Coeff.	Std. Error	Prob.	Coeff.	Std. Error	Prob.
	ARDL MODEL			FMOLS MODEL		
SSRT	0.3394**	0.1291	0.0373	0.6343*	0.1514	0.0023
LER	-3.5144*	0.8853	0.0026	10.8121*	3.0591	0.0064
GREE	0.0233	0.0132	0.1083	0.0413*	0.0101	0.0027
MMR	0.1528*	0.0293	0.0004	0.0704*	0.0202	0.0068
UNEP	-12.9941*	2.4488	0.0003	-18.0211*	1.9575	0.0000
CPS	1.3587*	0.2967	0.0010	2.4807*	0.2861	0.0000
FDI	-6.2902*	1.8298	0.0064	-4.0153*	0.8352	0.0010
INSQX	-2.1106**	0.7379	0.0170	-3.9906*	0.6897	0.0003
C	71.9982	50.8397	0.1871	128.1844*	33.9774	0.0044

Source: Author's computation, E-views 10

Note: \* denotes significance at 1%, \*\* denotes significance at 5%

The ARDL estimation technique in Table 3 reveals several important links between independent variables and income inequality in the long-run estimate findings for Model One, where income inequality is the dependent variable. The result of objective one shows

that secondary school enrolment has a positive and significant effect on income inequality (0.3394;  $p < 0.05$ ). This implies that, in the long run, increased access to secondary education is associated with higher income inequality in Nigeria by about 0.34 points. This result may reflect unequal access to quality education, where urban or wealthy households benefit more, widening income gaps. This finding supports Dabla-Norris et al. (2015), who reported that unequal access to education exacerbates inequality in developing countries. Similarly, Ogunniyi et al. (2020) found that the concentration of educational benefits among higher-income groups widens the income gap in Nigeria. Conversely, Barro (2019) argued that improvements in secondary education contribute to reducing income inequality in the long run by improving labour productivity and social mobility, suggesting that the quality and inclusiveness of education matter more than the quantity.

The outcome of objective two established that life expectancy has a negative and statistically significant effect on income inequality (-3.5144;  $p < 0.01$ ), indicating that better health outcomes reduce inequality. This suggests that when people live longer and healthier lives, they can participate more effectively in economic activities, improving their income potential. This finding is consistent with Harttgen and Vollmer (2014) and Bloom et al. (2018), who documented that improved health status reduces income disparities through higher labour productivity. However, Babones and Asafu-Adjaye (2021) found that in some low-income African economies, longer life expectancy can initially increase inequality if health improvements benefit higher-income groups disproportionately, reflecting health service inequities.

The outcome of objective three reveals that the unemployment rate disclosed a negative and significant relationship with income inequality (-12.9941;  $p < 0.01$ ). This unexpected result suggests that higher unemployment is associated with lower measured income inequality, which may occur because a large informal sector or widespread low-income status compresses income distribution downward. Similar paradoxical evidence was reported by Fields (2020), who found that during recessions, measured inequality can decline as high-income earners experience larger income drops. However, Adeleye and Gershon (2020) and Ibrahim and Umar (2022) contradict this, showing that unemployment typically worsens income inequality by reducing household earnings and increasing dependency ratios.

The ARDL model also reveals that government recurrent expenditure on education has a positive but statistically insignificant effect on income inequality (0.0233;  $p > 0.10$ ). This implies that recurrent spending on education in Nigeria does not significantly reduce inequality, possibly due to inefficient allocation, corruption, or spending bias toward tertiary institutions. Supporting evidence from Adewuyi and Awodumi (2022) indicates that government education spending in Nigeria has not substantially narrowed inequality because funds often fail to reach basic education. In contrast, Anyikwa and Awoyemi (2021) found that sustained education expenditure can lower inequality when effectively targeted at primary and vocational education sectors.

The coefficient of maternal mortality rate is positive and significant (0.1528;  $p < 0.01$ ), implying that higher maternal mortality increases income inequality. Poor maternal health reduces women's participation in the labour market and lowers household income potential, thereby widening income disparities. This is supported by the World Bank (2021) and Adeleye et al. (2020), who found that poor maternal health outcomes are closely linked to higher income inequality in Sub-Saharan Africa. Conversely, Klasen and Lamanna (2009)

argued that gender-related health indicators have only an indirect relationship with inequality, emphasizing the role of broader economic factors.

The result indicates that credit to the private sector has a positive and significant effect on inequality (1.3587;  $p < 0.01$ ), implying that financial development in Nigeria disproportionately benefits wealthier individuals and large firms. This supports the work of Jauch and Watzka (2016) and Khan and Nawaz (2021), who found that unequal access to credit in developing countries exacerbates inequality. In contrast, Beck et al. (2020) argue that financial deepening can reduce inequality when credit access becomes more inclusive through small and medium enterprise financing.

FDI negatively and significantly affects income inequality (-6.2902;  $p < 0.01$ ), suggesting that foreign capital inflows help reduce inequality in Nigeria by creating employment and promoting technological diffusion. This is in line with Adeleye et al. (2017) and Zahonogo (2018), who found that FDI promotes inclusive growth in Africa. Conversely, Herzer and Nunnenkamp (2013) and Meniago and Asongu (2022) reported that FDI can increase inequality when profits are repatriated abroad or when foreign firms employ mainly skilled labour, leaving low-skilled workers behind.

Institutional quality index has a negative and statistically significant effect on income inequality (-2.1106;  $p < 0.05$ ), implying that stronger institutions help mitigate inequality. Effective governance improves income distribution through accountability, corruption control, and fair resource allocation. This supports the findings of Savoia and Sen (2019) and Asongu and Odhiambo (2020), who found that institutional quality significantly reduces inequality in African economies. However, Chong and Gradstein (2015) argued that institutional improvement alone may not immediately reduce inequality without complementary redistributive policies.

Table 4.5a presents the long-run estimation results for Model 1, which examines the impact of education (SSRT), healthcare (LER and MMR), and unemployment (UNEP) on income inequality in Nigeria, controlling for other macroeconomic variables. From the ARDL model, secondary school enrolment (SSRT) has a positive and significant relationship with income inequality, implying that increased access to secondary education may initially widen income inequality, likely due to unequal educational opportunities or skill-based wage differentials. Life expectancy negatively and significantly influences inequality, suggesting that improvements in healthcare outcomes reduce inequality by enhancing productivity and welfare. Maternal mortality shows a strong positive relationship, indicating that poor maternal health worsens inequality. Unemployment negatively and significantly affects inequality, reflecting that higher employment opportunities reduce disparities in income distribution. Furthermore, credit to the private sector and foreign direct investment both significantly influence inequality, with CPS increasing inequality while FDI reduces it. Institutional quality is negatively significant, indicating that stronger institutions help curb inequality in Nigeria.

Comparatively, the FMOLS estimates show some divergent results in both magnitude and direction. For instance, while SSRT and MMR remain positively significant, the coefficients are larger under FMOLS, implying higher sensitivity. Interestingly, LER changes sign to a large positive coefficient, suggesting that FMOLS may overstate its effect due to its inability to account for short-run dynamics and feedback effects between variables. Similarly, government recurrent expenditure on education (GREE) is significant under FMOLS but not under ARDL, indicating that the ARDL model better distinguishes long-run

from short-run effects. The study prefers the ARDL approach because it is more suitable for small sample sizes, accommodates variables of mixed integration orders (I(0) and I(1)), and efficiently estimates both short-run and long-run relationships simultaneously. ARDL also corrects for potential endogeneity and serial correlation issues, producing more robust and reliable coefficients than FMOLS, which assumes all variables are I(1) and cointegrated. Therefore, the ARDL results are preferred for policy inference as they capture the dynamic adjustments and true long-term interactions between education, healthcare, and income inequality in Nigeria.

**Table 4: Short-Run Estimation Result**

Dependent Variable: *GINI*

Variables	Coefficient	Std. Error	T-Statistic	Prob.
D(GINI(-1))	1.4440*	0.1824	7.9169	0.0000
D(SSRT)	1.8639*	0.5204	3.5817	0.0033
D(LER)	11.5432*	3.2628	3.5378	0.0054
D(MMR)	0.0669*	0.0179	3.7438	0.0038
D(UNEP)	-18.0280*	2.2357	-8.0638	0.0000
D(FDI)	-4.2757*	1.0598	-4.0344	0.0024
CointEq(-1)*	-1.8652*	0.1911	-9.7597	0.0000

Source: Author's computation, E-views 10

Note: \* denotes significance at 1%, \*\* denotes significance at 5%

The coefficient of the lagged income inequality variable is positive and significant (1.4440,  $p < 0.01$ ), suggesting that income inequality in the previous period significantly influences the current level of inequality in Nigeria. This implies persistence in inequality dynamics; once inequality rises, it tends to remain high in the short run. This result supports the findings of Aderemi and Alabi (2023), who reported inequality inertia in Nigeria due to entrenched structural disparities. Similarly, Odhiambo (2022) observed path dependency in inequality for Sub-Saharan African countries. However, the finding contradicts Ojong et al. (2020), who found that inequality adjusted downward rapidly following redistributive policies in Ghana, suggesting that lagged inequality does not always exert a persistent influence.

Secondary school enrolment has a positive and significant coefficient (1.8639,  $p < 0.01$ ), indicating that higher secondary school enrolment is associated with higher income inequality in the short run. This may suggest that educational access benefits higher-income groups first before trickling down. This aligns with the argument by Barro (2019), who noted that in developing economies, education expansion initially increases inequality due to unequal access. In contrast, Kim and Lee (2020) found a negative relationship between education and inequality in East Asia, implying that broad-based education policies can reduce income disparity in the long run.

Life expectancy is positive and significant (11.5432,  $p < 0.01$ ), implying that improvements in health outcomes initially raise income inequality in Nigeria. This may occur because longevity benefits are more accessible to wealthier households. The result is supported by Kacprzyk and Kuchta (2021), who found that health improvements can temporarily widen income inequality when health infrastructure is concentrated among the rich. Conversely, Heshmati (2019) found that rising life expectancy reduces inequality in OECD countries by enhancing labour productivity across all income groups.

The maternal mortality ratio has a positive and significant effect (0.0669,  $p < 0.01$ ), suggesting that increasing maternal deaths worsens income inequality in the short run. This is expected since poor maternal health often reduces female labour participation and earnings. This result corroborates Rahman and Khan (2020), who found that high maternal mortality exacerbates inequality in developing nations. However, it contrasts with findings from Osei and Gyamfi (2021), who argued that health inequality on income distribution diminishes with effective primary healthcare interventions.

Unemployment exerts a negative and highly significant effect (-18.0280,  $p < 0.01$ ), implying that rising unemployment reduces income inequality in the short run. This unexpected inverse relationship might indicate that unemployment affects both rich and poor workers simultaneously, compressing the income gap temporarily. A similar short-run negative link was reported by Agenor (2019), who explained that job losses across all income groups could temporarily equalize income. However, this contradicts Abubakar and Bala (2022), who found that unemployment aggravates income inequality in Nigeria through income losses and social exclusion.

Foreign direct investment has a negative and significant coefficient (-4.2757,  $p < 0.01$ ), implying that increased FDI inflows reduce income inequality in Nigeria in the short run. This may suggest that foreign investments generate jobs or support inclusive growth sectors. The result supports findings by Asongu and Odhiambo (2020), who showed that FDI inflows narrow inequality when linked to productive sectors. Conversely, Tsaurai (2019) found that FDI increased inequality in Southern Africa by favouring skilled labour and capital-intensive industries.

The coefficient of the error correction term (-1.8652) is negative and significant, indicating that the system corrects disequilibrium rapidly, about 186% of deviations from the long-run equilibrium are adjusted within one period. This implies strong short-run adjustment dynamics toward equilibrium in income inequality. The magnitude and significance of the coefficient suggest that the model is stable and well-specified. Similar strong error correction behavior was found by Akinlo and Emmanuel (2021) in Nigeria's income-growth model, indicating fast convergence toward equilibrium, whereas Obeng and Adu (2020) reported a slower adjustment rate of 45% for Ghana.

### Diagnostic Test

To test for autocorrelation, the Breusch-Godfrey Serial Correlation LM Test was employed below. This test checks to see if serial correlation, which would weaken the model's assumptions, is present in the residuals. The null version of the hypothesis is provided for testing.

$H_0$ : There is no autocorrelation

**Table 5: Tests for Autocorrelation**

	F- Statistic	Observed $R^2$
Test Statistic	6.806396	17.63577
P-Value	0.0688	0.0001
Durbin-Watson test statistic	2.519640	

### Test for Heteroscedasticity

To determine if the variance of the error term is constant across all observations, the heteroscedasticity test is used. This is a component of the ordinary least squares (OLS) assumption, and if it is not true, we get the heteroscedasticity issue. Thus, the Breusch-

Pagan-Godfrey heteroscedasticity test was used to verify that the variance of the error term is constant. Table 6 provides a summary of the estimations as well.

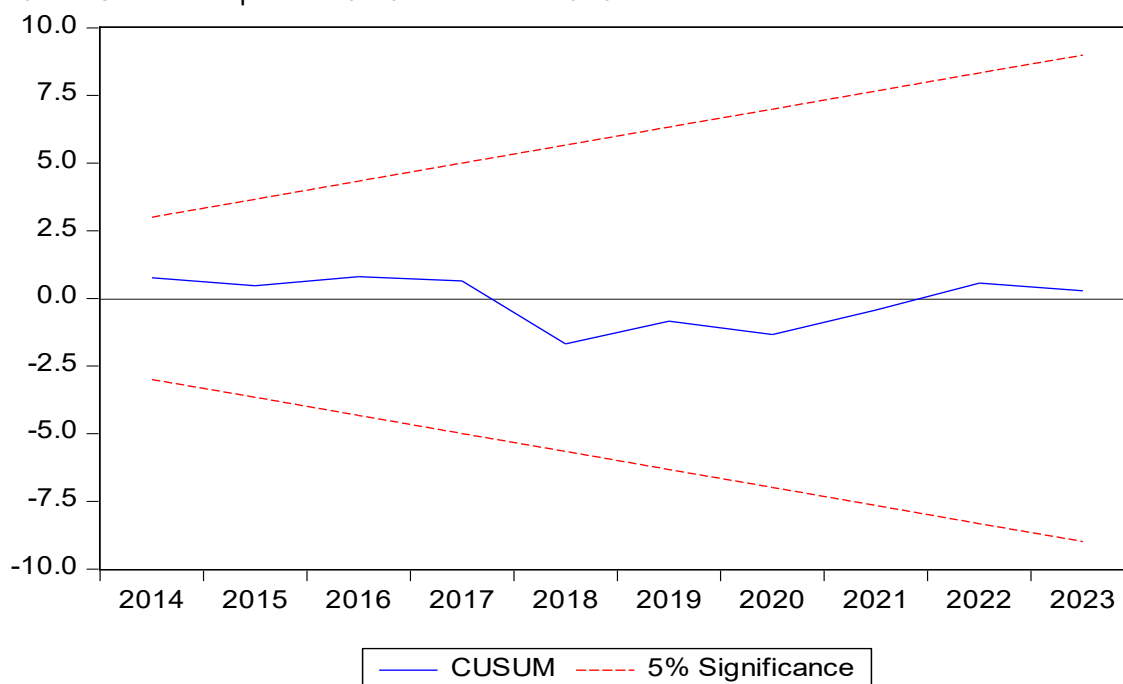
H<sub>0</sub>: The residuals are Homoscedasticity

**Table 6:** Test for Heteroscedasticity

	F-Statistic	Observed R <sup>2</sup>	Scaled explained SS
Test Statistic	1.097575	18.22987	3.129457
P-Value	0.4553	0.3745	0.9999

### Model Stability Test

The diagnostic tests to be conducted for the models are the CUSUM test to certify the stability of the models. In this case, the null hypothesis is that since the CUSUMt statistic is derived from a CUSUM(t-k) distribution, the CUSUM(t-k) is a symmetric distribution with a center of 0 and a dispersion that increases with t-k.



**Figure 1:** The CUSUM Stability Test

### Evaluation of Research Hypotheses

To achieve the specific objectives of the study and to make a valid evaluation of the research hypotheses, an ARDL estimation technique was used as an estimation procedure. Here is an evaluation of the four research hypotheses based on the findings:

The following null hypotheses are stated to guide the study:

**Hypothesis (H<sub>01</sub>):** Access to education does not significantly affect income inequality in Nigeria.

**Conclusion:** The ARDL results showed that in the long run, secondary school enrollment significantly increases income inequality (0.34, p < 0.05). Therefore, we reject the null hypothesis and conclude that access to education, proxied by secondary school enrolment, positively and significantly affects income inequality in Nigeria.

**Hypothesis (H<sub>02</sub>):** Healthcare does not significantly affect income inequality in Nigeria.

**Conclusion:** The ARDL results showed that life expectancy reduced income inequality (-3.514, p < 0.01). Therefore, the study rejects the null hypothesis and concludes that

healthcare proxied by life expectancy negatively and significantly affects income inequality in Nigeria.

**Hypothesis (H<sub>03</sub>):** Unemployment does not significantly affect income inequality in Nigeria.

**Conclusion:** The result shows that unemployment significantly widened income inequality (-12.99,  $p < 0.01$ ). Therefore, the study rejects the null hypothesis and concludes that unemployment negatively and significantly affects income inequality in Nigeria. The findings imply that education, health, and unemployment jointly play crucial roles in determining income inequality in Nigeria. Improvements in educational access and health outcomes, along with job creation policies, can significantly reduce inequality over time.

The results of the model when the ARDL estimation is applied indicate that secondary school enrolment (SSRT) positively and significantly affects income inequality in Nigeria in the long run, meaning that, the initial increase in educational access increases income inequality by approximately 0.34 points. This result indicates that education growth is mainly beneficial to the higher-income families in a trickle-down fashion, which is in line with Barro (2019), who found that education in third world economies might initially exacerbate inequality as access is distributed unevenly. In the same way, inequality is negatively and significantly related to the life expectancy (LER), which means that better health results decrease inequality in the long-run. Nonetheless, both life expectancy and maternal mortality ratio (MMR) were positive and significant in the short term, which means that an increase in health outcomes at the beginning increases inequality because of unequal health benefits distribution. Moreover, unemployment (UNEP) has a strong negative effect on income disparity, and it implies that an increase in unemployment rates will temporarily narrow the income gap since it will influence both the high and low income earners. This corroborates the work of Agenor (2019) but goes against the work of Abubakar and Bala (2022) which established that unemployment worsens inequality in Nigeria. The significance of the concept of institutional quality (INSQX) and foreign direct investment (FDI) also shows that both concepts substantially decrease the level of income inequality and thus emphasize the role of governance and inclusive investments in ensuring fair distribution of income.

The study can be summarized to come up with the following policy implications based on the analysis. The observation that greater access to secondary education can greatly increase income inequality in Nigeria indicates that education growth is not a sufficient measure to enhance equity. This is in agreement with the sentiments of Iwuno (2025) who pointed out that equitable and inclusive education systems are vital in achieving balanced national development. Therefore, government policies must not just be about the access, but also quality, relevancy and inclusivity. Investments must focus on educating teachers, ensuring the curriculum is up to date with labour market needs, and equal access to disadvantaged groups, in line with capacity-building models emphasised by Chukwurah et al. (2020). Moreover, the correlation between unemployment and inequality is negative, which highlights the importance of job creation strategies, vocational training, and support of SMEs, which contribute to productivity and economic growth (Mbuba, 2016). Obikeze et al. (2022) emphasize the significance of the coordinated governance and digital interaction in the implementation of such policies. Moreover, the beneficial effect of healthcare gains on inequality reduction also signifies the necessity of increasing access to healthcare, which can be efficiently facilitated via collaborative models, including such as public-private partnerships, as illustrated by Obi et al. (2026).

## CONCLUSION

This paper has explored the socioeconomic factors contributing to income inequality in Nigeria and their impact to economic growth between 1994 and 2023 using ARDL method and FMOLS as a strength check. It was found that the main socioeconomic variables education, healthcare, and unemployment play a significant role in determining income inequality both in the short and long term. Particularly, enrolment in secondary schools was observed to create imbalance and this indicated lack of equal access to quality education and imbalance in skills. Conversely, better healthcare, estimated by life expectancy, inequality, emphasize the contribution of the increase in productivity and income distribution by better health outcomes. Inequality was negatively correlated with unemployment, which is a manifestation of structural labour market conditions and a low level of incomes.

Moreover, the institutional quality and foreign direct investment have helped in curbing inequality whereas credit to the private sector has a tendency to increase inequality, which is a measure of unequal access to financial resources. The authors conclude that income inequality in Nigeria is caused by structural imbalances in human capital formation, labour market, and the effectiveness of institutions. Unless these disparities are dealt with, they can frustrate sustainable economic growth through a low aggregate demand and restrictive inclusive development. Thus, equitable growth in Nigeria can only be attained through specific investments in inclusive education and medical services, enhanced institutional structures, and policies that can facilitate the creation of broad-based jobs and equitable access to economic opportunities.

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