



INCOME INEQUALITY AND POVERTY IN NIGERIA

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Abstract

This study carefully examined the impact of income inequality on poverty in Nigeria from 1985-2022. With the utilization of data on poverty incidence, Gini index, misery index and human development index from the Standardized World Income Inequality Database (SWIID), United Nations Development Programme (UNDP), World Bank - World Development Indicator and the used of co-integration and error correction techniques of econometrics to analyze the data so as to know the association that exist among the variables. The regression result revealed that income inequality has positive and insignificant relationship with poverty incidence in Nigeria. At the same time, misery index and human development index have positive and significant relationship with poverty incidence in Nigeria. Based on the empirical result, this study concluded that, income inequality has increased the incidence of poverty in Nigeria but the rate of increase is not significant during the period of study. The study recommended that government should avoid ill-use, misallocation and misappropriation of resources (wealth). It (government) should also strive to ensure a more equitable distribution of wealth, which will effectively lessen income inequality and incidence of poverty in Nigeria. Government should initiate and implement welfare policies that will help to reduce income inequality and the incidence of poverty in the country. The government should also develop and implement realistic employment programmes in Nigeria which in turn will help to reduce income inequality and poverty incidence in the country.

Keywords: *Poverty, Income Inequality, Gini Index, ECM, Nigeria*

INTRODUCTION

Income inequality and poverty have been widely acknowledged as major global development challenges as evidenced by the globally popular adoption of the Sustainable Development Goals (SDGs) which call for, among others, the eradication of poverty in all its forms, everywhere and reduction of inequality within and among countries. Income inequality and the level of poverty are critical indicators of economic development. According to Musa, Enaberue and Magaji (2024), income inequality and poverty are two interrelated and mutually reinforcing developmental issues in Africa. The inability to pay for needs like clothing, food, housing, and a basic education results in impoverished individuals becoming emotionally and psychologically despairing. As a result, among other things, illnesses, social vices, and institutional abuse are more common among the impoverished in society (Obayori, Udeorah & Aborh, 2018).

In addition, Krokeyi and Obayori (2020) identified increase in the incidence of poverty and income inequality as the major limitations to growth and development in Nigerian economy. Over the years, different governments in Nigeria have articulated and executed a myriad of poverty intervention programmes in an attempt to tackle the problem of poverty in the country. The poverty intervention programmes adopted include Better Life Programme for Rural Dwellers (BLP) in 1987, Family Economic Advancement Programme (FEAD) in 1997, The National Directorate of Employment (NDE) in 1986, The National Poverty Eradication Programme (NAPEP) in 2001 and Youth Enterprise with Innovation in Nigeria (YouWin) in 2011. Yet, the Nigeria's poverty trouble has remained worse because of wide spread corruption, fiscal indiscipline, inadequate administrative capacity (i.e., lack of capacity to formulate appropriate poverty policies and effectively implement them), policy instability, etc. (Umo, 2012).

Furthermore, Gbosi (2012) argued that over the years, billions of naira had been budgeted by the government to improve the socio-economic conditions of people in Nigeria. Unfortunately, the funds released to ministries and other agencies are usually misappropriated by top government officials. Consequently, the funds did not get to the people. This unpleasant development has forced more than 70 percent of Nigerians to live below the poverty line.

The problem of poverty in Nigeria is worrisome given the large resources that the country is endowed with. The country has increasing rates of poverty and income inequality. For instance, poverty incidence which was 27.2% in 1980 increased to 46.3% in 1985. It declined slightly to 42.7% in 1992 and increased very sharply to 65.6% in 1996. It further increased to 69.0% in 2010 (National Bureau of Statistics, 2010 and World Bank, 2011). According to the National Bureau of Statistics (NBS) 2020 report on poverty and inequality in Nigeria, about 83

million people, or 40% of the country's total population, live below the poverty line, which is set at 137,430 naira (\$381.75) annually.

In Nigeria, income inequality is quite extreme. The situation in the country is such that only a small percentage of the population benefits from the nation's increasing wealth, with the majority continuing to live in poverty and hardship (Oxfam International, 2017; and Musa, Enaberue & Magaji, 2024). According to a report by National Bureau of Statistics (NBS, 2010), in 2004, the Gini Coefficient for Nigeria was 0.4296 whereas in 2010 it was 0.4470 indicating that inequality increased by 4.1 percent nationally. According to Oxfam International's assessment of income inequality in May 2017, the Gini Index increased from 40% in 2003 to 43% in 2009. Information from the World Bank indicates that the Gini income inequality index reached its peak in 1996 at 51.90, but it fell to 35.10 in 2018 (World Bank, 2018). In lieu of the background above, this study examined the impact of income inequality on poverty incidence in Nigeria from 1985 to 2022. Other sections of this study are organized as follows: the review of related literature, material and methods are contained in sections two and three respectively. The empirical results and discussion are presented in section four while the conclusion and policy recommendations are presented in section five.

REVIEW OF RELATED LITERATURE

Conceptual Clarification

Poverty and Income Inequality

In most definition of poverty, the major distinguishing characteristic is income. Therefore, in general, poverty is defined as lack of income, or inadequate income to purchase the basic essentials of life. According to Umo (2012), poverty may be defined in either absolute or relative terms. In absolute terms, a person is poor when he or she cannot afford basic necessities of life such as foods, shelter, clothing, basic education and etcetera. It is sometime referred to as abject poverty. Todaro and Smith (2011) see absolute poverty is a situation of being unable or only barely able to meet the subsistence essentials of food, clothing, and shelter. In terms of interpretation absolute concept of poverty compares two numbers a person's yearly income and poverty threshold or poverty line for each person or group of people. Poverty line is the level of income required for basic subsistence. It is vital to note that it is absolute poverty that economic development policy pursues to eliminate or end. It is possible to find a solution to bring to an end basic material deviation. This explains why UN-driven sustainable development goals (SDGs) – 1 and 10 aim at bringing poverty to an end in all its forms everywhere and reduce inequality by 2030. In relative terms, Gbosi (2012) and Umo (2012) stated that we can say that some households are poor in comparison with others. They (i.e., Gbosi and Umo) went on to

say that poverty is more than just a lack of resources for production and income in order to maintain sustainable livelihoods. But hunger and malnutrition, restricted access to essential services like education, social marginalization and prejudice, and a lack of involvement in decision-making are some of its expressions.

Poverty has affected the economy negatively. For instance, poverty leads to a low standard of living. The poor and their families cannot afford good meals, descent housing, clothing, good education and good medical care. Crime rate has increased over the last couple of decades almost in sympathy with increase in poverty. Violent crimes, including broad daylight robbery, have become common sights in most urban centres in the country. In Nigeria, many unemployed individuals usually resort to stealing and other criminal activities because of poverty. According to Umo (2012), extreme poverty breeds hunger and anger. When these two basic human instincts are combined and the number of people affected reaches a critical mass, social conflict is the result and the resolution is never sustainable unless the fundamental cause are addressed. From time to time in Nigeria, pockets of conflicts have erupted to arrest development in several parts of the country.

In addition, the unfair allocation of money among the constituents of a certain group, an economy, or a community is referred to as income inequality. The Lorenz curve, Gini coefficient, and General Entropy class can all be used to measure the unequal distribution of income. Gini coefficient is the most commonly used measure and it is close to the Lorenz curve. It is a final and very convenient shorthand summary measure of the relative degree of income inequality in a country. The Gini coefficient measures income inequality based on the Lorenz curve. It has values between zero (0) and one (1). Figures closer to zero (0) signifies more equality in the distribution of income, values closer to one (1) shows higher inequitable distribution of income, zero (0) signifies absolute equality in the distribution of income and one (1) signifies absolute inequality in the distribution of income. Put differently, the higher the value of the Gini coefficient, the higher the inequality of income distribution; the lower it is, the more equal the distribution of income.

Review of Theoretical Literature

Cultural Theory of Poverty

The work of American anthropologist Lewis (1968), who investigated impoverished communities in Mexico and Puerto Rico in the 1950s and 1960s, is the source of this theory. According to this theory, impoverished people in Third World countries have a unique culture with attitudes, customs, and beliefs that set them apart from those of the mainstream culture. The inability to postpone gratification and resignation that characterize this culture of poverty

cause the impoverished to accept their lot in life rather than attempting to overcome it (Tubotamuno, Inimino, and Awortu, 2018). The failure of the impoverished to postpone gratification makes it difficult for them to save money for the future, plan ahead, or join community organisations, political parties, trade unions, or other organisations that could aid them. Lewis (1968) as cited in Tubotamuno, Inimino and Awortu (2018) believes that this way of life was passed on from parents to children. Children learn the culture from an early age. It helps them to cope with day to day life in poverty, but they are ill-equipped to take advantage of opportunities such as education which might help them to escape from poverty. In this way, the poverty of parents is passed on to children. Therefore, people are poor because poverty is in them (inherited) and their actions including laziness, lack of education and single female headed family (Tubotamuno, Inimino and Awortu, 2018).

Structural/Economic Theory of Poverty

According to this theory, poverty is mostly caused by the structure of an economy. A large number of proponents of social democratic theories view poverty as a byproduct of the labour market's creation of inequality in capitalist economies. They make the point that the majority of groups living in poverty are either excluded from the labour market – for instance those who are unemployed, people who have reached retirement age and people who are unable to work due to illness or disability—or they are in a weak position and are therefore typically limited to low-paying, often temporary, and unstable jobs – for example, workers with limited skill sets and people who face discrimination, like women, Black people, and people with disabilities. Therefore, among the factors that promoted poverty were the degree of employment and the structure of income distribution (Tubotamuno, Inimino, and Awortu, 2018). This line of argument has been developed by Townsend (1979), Townsend, Corrigan and Kowarzik (1987). For Townsend (1979), poverty is closely related to class. Most impoverished people work in unskilled or semi-skilled occupations, or have worked in them. As a result, poverty is not a result of a lack of hard effort but rather a lack of opportunities for employment. People become impoverished as a result of the economic system's denial of their fair share of wealth and unequal income distribution. According to Townsend, the unequal distribution of the country's income is the root cause of poverty.

Review of Related Empirical Literature

Experiential evidence on the association between income inequality and poverty has been conflicting with contradictory findings as a result of differences in samples used, econometric techniques, measurement of poverty, specifications and country peculiarities. This

discrepancy in empirical research findings has further increased interest in the topic in recent years. In this paper, few empirical studies conducted on the connections between disproportionate distribution of income and poverty are presented chronologically from old to new. According to this:

Ravallion (2006) studied the effects of income inequality on poverty in India and China in 1980-2000 using quantitative technique. The result revealed that economic growth reduced poverty in the two countries, and income inequality reduced the effectiveness of poverty reduction. Furthermore, the researcher also reported that poverty reduction needed a combination of economic growth, a sort of “*pro-poor*” pattern of economic growth, and income inequality reduction.

Using a 2SLS approach in panel data, Son (2007) analyzed the relationship between income inequality, poverty and inclusive growth in 43 developing countries over the period of 1980-2004. The outcome of the study suggested that in the countries with high per capita income, implementation of inclusive growth policies has led to the alleviation of income inequality and poverty.

Ogbeide and Agu (2015) used Granger causality technique to study the causality between poverty and income inequality in Nigeria. The result revealed a direct line of causality between poverty and inequality as well as indirect channels through unemployment and low life expectancy on inequality which exacerbate poverty in Nigeria.

Using the Lorenz curve and Gini coefficient, Lucky and Achebelema (2018) investigated the relationship between poverty and income inequality in Nigeria. The Gini coefficient was used to measure income disparity, while the food poverty line, absolute poverty line, subjective poverty measure, and dollar per day poverty line were used to measure poverty. Significant percentages of Nigerians, according to the findings, live below the poverty line. The analysis also showed that there is a significant wealth disparity in Nigeria.

Krokeyi and Obayori (2020) employed secondary data from 1985-2018 and Generalized Method of Moments (GMM) to examine income distribution and poverty reduction in Nigeria. The result revealed that a percentage increase in income inequality will cause poverty level to rise significantly. On the other hand, a percentage increase in wages will bring about corresponding decrease in poverty level.

Obayelu and Edewor (2022) utilised a methodology that encompassed bibliographic inquiry to gather data regarding the connections between the dynamics of poverty in Nigeria and economic inequality. The literature review's conclusions showed that one of the main factors influencing the descent into poverty is economic disparity. Poverty exists because of inequality, and inequality exists because of poverty. The literature still doesn't agree on the direction of the

relationship between poverty and economic inequality. While some research indicates a negative direction, other data point to a positive, bidirectional, and inconclusive association.

Firat and Mehmet (2023) examined the association between income inequality, poverty and economic growth in selected eight developing countries (Turkey, Brazil, Poland, Mexico, Argentina, Indonesia, China and Russia) determined by the World Bank's Atlas method between 2000 and 2020. The study's main issue is that poverty and wealth inequality in developing nations have become worse recently. The relationship between income inequality, poverty, and economic growth in developing nations was investigated using panel data analysis, and a variety of data sets, including the Gini coefficient, head number index, per capita national income, democracy index, human development index, and misery index, were employed. Income inequality, poverty and economic growth were analyzed with three different models) and compared with each other. Considering the results of the analysis, the Durbin-Hausman co-integration test was conducted to reveal the existence of a long-term relationship between the variables, and the existence of a long-term co-integration relationship between the variables was determined.

According to the results of Dumitrescu Hurlin causality test, a bidirectional causality relationship was found between the variables. Panel regression research revealed that while increases in national income per capita lead to greater income inequality, increases in per capita income and democracy both lower poverty, and increases in the democracy index raise per capita income. The findings have led to the proposal of a number of social, economic, and political initiatives aimed at boosting economic growth and reducing poverty and income disparity.

An Auto Regressive Distributed Lag (ARDL) model was used by Musa, Enaberue, and Magaji (2024) to evaluate the effect of income inequality on the level of poverty in Nigeria. The findings demonstrated that there is a long-term positive relationship between the poverty level and the Gini coefficient of income inequality in Nigeria, based on the association each income determinant displayed with the Gini coefficient of income disparity in the Nigerian economy. based on the result, it is suggested to enhance a more equitable distribution of wealth, since this will significantly reduce poverty and economic inequality in Nigeria.

Stylized Facts on Poverty and Income Inequality in Nigeria

Poverty is widespread and severe in Nigeria. The proportion of Nigerians living in poverty is increasing every year. For instance, poverty incidence which was 27.2% in 1980 increased to 46.3% in 1985. It declined slightly to 42.7% in 1992 and increased very sharply to 65.6% in 1996. It further increased to 69.0% in 2010 (National Bureau of Statistics, 2010 and

World Bank, 2011). The 2019 poverty and inequality in Nigeria report released by the National Bureau of Statistics (NBS) in 2020 revealed that 40 percent of the total population, or almost 83 million people, live below the country's poverty line of 137,430 naira (\$381.75) per year (NBS, 2020).

Moreover, Williams (2016) argued that the rural areas are most affected with poverty in Nigeria. For instance, urban poverty stood at 17.2%, 37.8%, 37.5% and 58.2% in 1980, 1985, 1992 and 1996 respectively. Meanwhile rural poverty stood at 28.3%, 51.4%, 46% and 69.8% in 1980, 1985, 1992 and 1996 respectively (NBS, 2005). In addition, poverty headcount rate, in percent of population in strata for urban area was 18 in 2019 while it stood at 52.1 in rural area in 2019 (NBS, 2020). The reasons for the increase in poverty include the many years of neglect of the rural areas in terms of infrastructural development and lack of information on the way government is being run. The bulk of Nigeria's rural impoverished people make their living through subsistence farming and other skills including carpentry and tailoring. They lack access to quality healthcare facilities. They have small sized farms, use traditional farming inputs, and face food insecurity during the raining season just before harvest. During this period, the poor people lack quality food, fall sick and live in debt. They do not have access to adequate shelter (manifested in poor houses and overcrowding). They cannot afford quality education for their children (Williams, 2016). In addition, poverty has driven people to engage in deforestation, overfishing and overhunting thereby rendering the environment economically unsustainable for both the present and the future generation. Poverty also deprives the poor the sense of self-worth, hence, dignity. As a person regards himself as a non-person, suicidal tendencies can develop (Gbosi, 2012 & 2015).

The daily battles of the majority of Nigerians against the amassing of outrageous wealth by a small number of persons while the majority of people live in poverty are a manifestation of the country's extreme economic disparity. Nigeria's income disparity and poverty are especially shocking because they have been developing amid the backdrop of an economy that is expanding and enriches a small minority of people at the expense of the majority. Income inequality, as measured by Oxfam International in May 2017 revealed that the Gini Index grew from 40% in 2003 to 43% in 2009. According to World Bank data, in 1985, Nigeria's Gini income inequality index was 38.70. It increased to 45.00 in 1992 and recorded its highest figure in 1996 with a Gini income inequality index of 51.90. In 2003, Nigeria's Gini income inequality index was 40.10. In 2010, 2012, 2015 and 2018 stood at 35.70, 35.50, 35.90 and 35.10 respectively (World Bank, 2018). According to a report by National Bureau of Statistics (NBS, 2010), in 2004, the Gini Coefficient was 0.4296 whereas in 2010 it was 0.4470 indicating that inequality increased by 4.1 percent nationally.

Nigeria has a high rate of regional inequality, which contributes to greater rates of poverty. In Nigeria, poverty and inequality result from the improper use, misallocation, and theft of resources rather than a lack of them. The fundamental cause is a political elite disconnected from the problems faced on a daily basis by ordinary Nigerians, along with a culture of corruption and rent-seeking. The overlap between political and economic power bends the allocation of opportunities, income and wealth to vested interests, and biases policy-making in favour of the rich. A first consequence is the astronomical cost of governance. Costs of maintaining the machinery of government are also inflated by the excessive staff numbers, inflated salaries and benefits, arbitrary increase in the number of government agencies and committees, hidden allowances and oversized retirement packages. The high cost of governance reinforces inequality because it means that few resources are left to provide basic essential services for the wider, growing Nigerian population.

Elite capture of public sector policies and resources undermines the productivity of the most important sectors of the economy and prevents the fair distribution of the benefits of growth. This is especially notable in agriculture and in the oil sector. Agriculture is the main source of non-oil exports and employs almost half of the Nigerian population. However, unfavourable policies have prevented small, poor farmers from benefiting from agricultural growth (Oxfam International May 2017).

MATERIAL AND METHODS

This study is quantitative in nature and employed the ex-post facto research design which is frequently employed as a substitute for true experimental research to test hypotheses about cause-and-effect relationships. The study used secondary data (poverty incidence, Gini index, misery index and human development index) from 1985 to 2022 for the analysis. Importantly, the researchers would have loved to cover from 1970 to 2023 but because of paucity of data the researchers decided to cover for the period data were available. Therefore, the period 1985 to 2022 was chosen because of paucity of data. Data for the study were collected from the Standardized World Income Inequality Database (SWIID), United Nations Development Programme (UNDP), World Bank - World Development Indicator and Nigeria's apex bank. The study employed Augmented Dickey Fuller (ADF) unit root test, Johansen Co-integration test and Error Correction Model (ECM). Precisely, this study used an econometric model aimed at capturing the relationship between income inequality and poverty in Nigeria. Guided by the perceived functional association between the matrix of income inequality and poverty, a link is provided between the variables in line with the related literature reviewed. Specifically, this work adapted the model of Musa, Enaberue and Magaji (2024) who

investigated the impact of income inequality on poverty level in Nigeria. That is, the model was cast in agreement with that of Musa, Enaberue and Magaji (2024), whose model is in the form Poverty Rate (POV) = f(Inequality - INQ, Unemployment Rate - UNEMP, Inflation Rate - INFL) but with important modification. Besides the poverty incidence and income inequality, this study included two control variables namely misery index and human development index not included in the work of Musa, Enaberue and Magaji (2024). Strictly speaking, the model for this study states that, Poverty Incidence (POV) depends on income inequality proxied by Gini Index (GI), Human Development Index (HDI) and Misery Index (MI) - the sum of the unemployment, inflation and bank lending rates, minus the percentage change in real GDP per capita. The functional relationship and the resultant model for this study is as specified below (i.e., the model for this study is presented thus):

$$\text{POV} = F(\text{GI}, \text{HDI}, \text{MI}) \quad (1)$$

$$\text{POV}_t = a_0 + a_1\text{GI}_t + a_2\text{HDI}_t + a_3\text{MI}_t + u_t \quad (2)$$

Where: POV = Poverty Incidence, GI = Income Inequality, HDI = Human Development Index, MI = Misery Index, u = Error Term, a_0 = the constant parameter, a_1 , a_2 and a_3 = the slope parameters. **Apriori expectation:** On the apriori: a_1 and $a_3 > 0$; $a_2 < 0$

In addition, the unit root test encompasses testing the order of integration of the individual series in a model precedes Co-integration and ECM. The unit root test used in this study is the Augmented Dickey-Fuller (ADF). The general form of ADF is estimated by the following regression $\Delta\text{HDI}_t = \alpha_0 + \alpha_1\text{HDI}_{t-1} + \sum \alpha_i \Delta\text{HDI}_i + \delta_t + u_t$ (3)

Where: y is a time series, t is a linear time trend, Δ is the first difference operator, α_0 is a constant, n is the optimum number of lags in the independent variables and u is random error term. Co-integration is an econometric technique used for testing the correlation between non-stationary time series data. Two variables are said to be Co-integrated if they have a long run or equilibrium relationship between them (Gujarati, 2007). This study used Johansen co-integration procedure. The basic argument of Johansen's procedure is that the rank of matrix of variables can be used to determine whether or not the two variables are co-integrated. A lack of co-integration suggests that such variables have no long-run relationship. According to Johansen (1998), the general form of co-integration is given by

$$\text{HDI}_t = \mu + \Delta_1\text{HDI}_{t-1} + \dots + \Delta_P y_{t-p} + u_t \quad (4).$$

Where: Y_t is an $n \times 1$ vector of variables that are integrated of order commonly denoted (1) and u_t is an $n \times 1$ vector of innovations. However, an extension of this in the co-integration technique is the Error Correction Mechanism (ECM) (Engle and Granger, 1987). These authors have established that Co-integration is a sufficient condition for an Error Correction Model formulation.

Furthermore, if co-integration is proven to exist, then the next step requires the construction of Error Correction Mechanism (ECM) to model dynamic relationship. The ECM's function is to show how quickly the short-run equilibrium state is adjusting to the long-run equilibrium state. The greater the co-efficient of the parameter, the higher the speed of adjustment of the model from the short-run to the long-run. The study represents the model specification with an error correction form that allows for inclusion of long-run information thus, the ECM can be formulated as follows:

$$\Delta Q_t = \beta_{10} + \sum \beta_{11t} \Delta Q_{t-1} + \sum \beta_{12t} \Delta Y_{t-1} + \sum \beta_{13t} \Delta Z_{t-1} + \delta_1 ECM_{t-1} + u_{1-t} \quad (5)$$

Where; Q is the dependent variable, $\beta_1 - \beta_2$ are the slope parameters, $Y_1 - Y_3$ are the set of explanatory variables, $\delta_1 ECM_{t-1}$ is the coefficient of ECM, Δ is change and μ is the disturbance term. Based on our model in 2, the dynamic (error correction) representation is given below:

$$\Delta POV_t = \beta_0 + \sum \beta_1 \Delta GI_{t-1} + \sum \beta_2 \Delta HDI_{t-1} + \sum \beta_3 \Delta MI_{t-1} + \delta_1 ECM_{t-1} + \mu_{1-t} \quad (6)$$

Note the variables as earlier defined. Furthermore, the data collected and utilized in this work were from the Statistical Bulletin of Nigeria's apex bank. It covers the period 1985-2022. It is taken that the data are a true representative of the Nigerian economy.

RESULTS AND DISCUSSION

Descriptive Statistics for Underlying Series

This study used descriptive statistics to describe the basic features of the data in the study. Specifically, the essence of the descriptive statistics is to ascertain stability of the time series.

Table 1: Descriptive Statistics (*E-views 10 output*)

	POV	GI	MI	HDI
Mean	71.49474	41.01579	39.93816	0.460624
Median	72.10000	40.90000	35.12000	0.464500
Maximum	93.70000	42.80000	93.27000	0.540000
Minimum	41.50000	39.20000	15.82000	0.328000
Std. Dev.	17.85212	1.072891	17.69892	0.060642
Skewness	-0.259609	0.246273	1.606095	-0.438400
Kurtosis	1.674536	1.842083	5.215207	2.075911
Jarque-Bera	3.208537	2.507008	24.10674	2.569306
Probability	0.201037	0.285503	0.000006	0.276747
Sum	2716.800	1558.600	1517.650	17.50370
Sum Sq. Dev.	11791.84	42.59053	11590.32	0.136067
Observations	38	38	38	38

Note: POV, GI, MI and HDI as earlier defined

The descriptive statistics reported in Table 1, indicates that poverty incidence (POV), Gini index (GI), misery index (MI) and human development index (HDI) averaged 71.49474, 41.01579, 39.93816 and 0.460624 respectively during the period of study. The standard deviation showed that all the variables converged around their mean. The Skewness test result showed positive values for Gini index and misery index, suggesting that they have high tails. It also revealed negative values for poverty incidence and human development index, which means that the tails are not high. Poverty incidence, Gini index (income inequality) and human development index are platykurtic relative to normal, since their values for kurtosis 1.674536, 1.842083 and 2.075911 are less than 3. This suggests that the variables have short and thin tails, and their central peaks are lower and broader. Moreover, misery index has leptokurtic distribution relative to normal, since its value for kurtosis 5.215207 is more than 3. This indicates a flatter than normal distribution and the variable has large tail. That is, it has longer and fatter tail, and its central peak is higher and sharper.

At the same time, the probability of Jarque-Bera statistics suggests that the hypotheses of normal distribution for poverty incidence, Gini index (income inequality and human development index were accepted at 5% level while the hypotheses of normal distribution for misery index was rejected at 5% level. Thus, the researcher concludes from the revealed statistical properties of the time series that one of the variables is not normally distributed, which may have resulted from the problem of unit root. This necessitated the unit root test for stationarity as shown in Table 2.

Unit Root Test

To avoid spurious regressions which may arise as a result of carrying out regressions on time series data, this study first subjected the data to stationarity test by using the Augmented Dickey Fuller (ADF) tests (Table 2).

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test (*E-views 10 output*)

Variables	Level form		First difference		Order of integration
	ADF Statistics	5% Critical Value	ADF Statistics	5% Critical Value	
POV	0.136752	-3.552973	-3.675130	-3.552973	1(1)
GI	-1.634707	-3.536601	-6.040099	-3.540328	1(1)
MI	-2.898333	-3.536601	-4.143184	-3.580623	1(1)
HDI	-3.421508	-3.540328	-10.57920	-3.540328	1(1)

Note: POV, GI, MI and HDI as earlier defined

The result of the ADF test for each of the series presented in Table 2 reveals that at five per cent level of significance, all the variables were stationary at first difference 1(1). The results of the variables being stationary at order 1(1) makes it inappropriate for the application of the Ordinary Least Square (OLS) method, therefore the tests to determine the long run relationship can be achieved with the aid of the Johansen Co-integration test which is presented in Table 3.

Test for Co-integration

Co-integration is conducted based on the test proposed by Johansen. According to Iyoha and Ekanem, (2002) Co-integration deals with the methodology of modeling non-stationary time series variables (Table 3).

Table 3: Johansen Test for Co-integration (*E-views 10 output*)

Eigen value	Trace Statistic	5% critical value	Prob. **	Hypothesis of CE(s)
0.617705	70.93747	47.85613	0.0001	None *
0.429704	36.32122	29.79707	0.0077	At most 1 *
0.244724	16.10362	15.49471	0.0405	At most 2 *
0.153505	5.999434	3.841466	0.0143	At most 3 *

Table 3 indicates that there are four Co-integrating equations because four of the Trace Statistic(s) are larger than critical value at 5%. Therefore, there is a long-run relationship among POV, GI, MI and HDI, which prevent them from wandering apart without bound. Given that there are four Co-integrating equations, the requirement for fitting in an Error Correction Model is satisfied. The Error Correction Mechanism (ECM) intends to validate the presence of long-run association and incorporate the short-run dynamics into the long-run equilibrium association.

Table 4: Parsimonious Error Correction Model (*E-views 10 output*)

Regressors	Coefficients	t-Statistic	P-Value
D(GI(-1))	0.961970	1.173829	0.2511
D(MI(-1))	0.062289	2.454967	0.0211
D(HDI(-1))	77.19534	4.086998	0.0004
ECM (-1)	-0.097079	-0.931213	0.3603
R² = 0.709872	D-W stat. = 2.185389	Prob(F-statistic) = 0.000012	
Akaike info criterion = 4.240151	Schwarz criterion = 4.599294	F-statistic = 9.087929	

Table 4 indicates that the dynamic model is a good fit. The reason is that the difference in predictors account for 71 percent of the overall disparity in the model looking at the R^2 . Put differently, the R^2 value of 0.709872 indicates that the variation in poverty incidence (POV) explained by Gini index (income inequality – GI), human development index and misery index is 71 percent. Therefore, the explanatory power of the model estimated is 71 percent. The Durbin Watson (DW) value of 2.185389, suggests that the model is free from autocorrelation. The coefficient of the Error Correction Term appears with the right sign (i.e., negative). This shows that disequilibria in the POV in the previous year were corrected for in the current year. It therefore, follows that the ECM could rightly correct any deviations from short run to long-run equilibrium relationship between POV and the explanatory variables.

Additionally, the coefficient of income inequality (GI) appears with the right sign (i.e., positive) implying a positive relationship between income inequality and incidence of poverty. This conforms to the apriori expectation. The implication of this result is that any percentage increase in income inequality will increase poverty incidence in Nigeria. That is, increase in income inequality exacerbated poverty incidence in Nigeria during the period of study. This also reveals that, inequality of income has increased poverty incidence in Nigeria during the period covered by this investigation. This is premised on the fact that a large portion of income is concentrated in a few hands which has made the incidence of poverty to be high. The finding is consistent with earlier empirical studies including Krokeyi and Obayori (2020) who reported a positive relationship between income inequality and poverty level in Nigeria. However, the absolute value of the t-statistic for the slope coefficient of income inequality is not significant at conventional level (i.e., 5 %). Thus, the study accepts that there is no significant relationship between income inequality and poverty incidence in Nigeria during the period of this study. At the same time, misery index and human development index have positive and significant relationship with poverty incidence in Nigeria during the period of this study.

Post Estimation Diagnostic Tests Results

Diagnostic tests were conducted in this study to verify whether or not the estimated model is reliable for policy prediction or recommendation purpose. This study specifically employed the Wald test for coefficient of restriction, Breusch-Godfrey (B-G) Lagrange Multiplier (LM) test for serial correlation and normality test (Table 5, Table 6 and Figure 1).

Wald Test

The Wald test is applied to confirm if the coefficients of the causal variables in the ECM model are jointly significant. The F-statistic in Tables 5 was utilized to ascertain this.

Table 5: Wald Test Result (*E-views 10 output*)

Test Statistic	Value	Df	Probability
F-statistic	261.1579	(4, 26)	0.0000
Chi-square	1044.632	4	0.0000

The result in Table 5 shows that the F-statistic is approximately 261 and the probability value of 0.0000 is less than 0.05 at the conventional 5 per cent level. Therefore, all the independent variables used in the model are jointly important in explaining poverty incidence in Nigeria during the period of study.

Test for Serial Correlation

The Breusch-Godfrey Serial Correlation LM test was used as a higher order test statistic for testing the null hypothesis of no serial correlation against the inferred alternative hypothesis of serial correlation in the ECM result at 5 per cent level of significance.

Table 6: Breusch-Godfrey Test for Serial Correlation (*E-views 10 output*)

F-statistic	1.055428	Prob. F(2,24)	0.3636
Obs*R-squared	2.748632	Prob. Chi-Square(2)	0.2530

The result as displayed in Table 5 reveals that the error correction model is not suffering from serial autocorrelation problem. This is because the chi-square value and the corresponding probability value of the chi-square statistic surpass the 0.05.

Normality Test Result

The Jarque-Bera statistic was applied to examine whether the error term in the economic growth model is normally distributed at 5 per cent significance level.

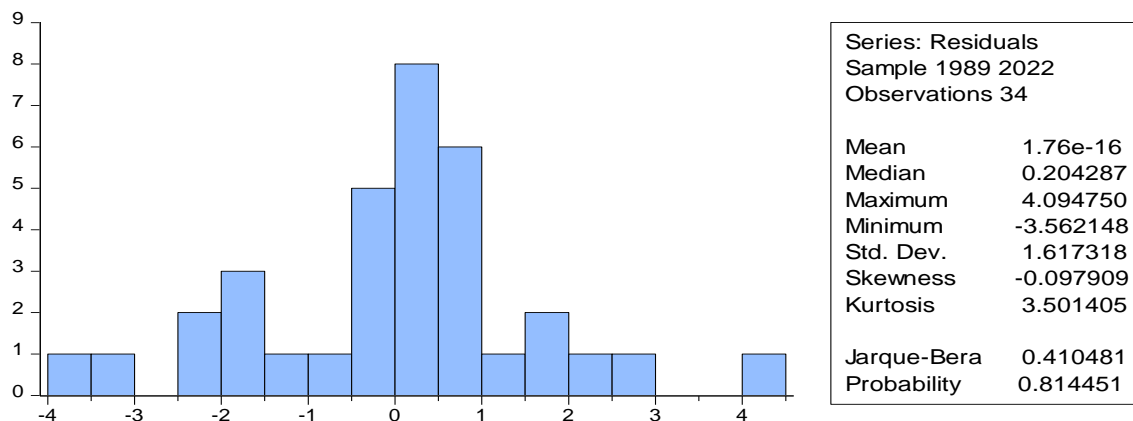


Figure 1: Normality Test Result (*E-views 10 output*)

The result shown in Figure 1 depicts that the error term is normally distributed at the conventional level (i.e., 5%). This is because the probability value of the Jarque-Bera statistic of approximately 0.814 is greater than the 0.05% conventional level. This implies that the Jarque-Bera statistic hypothesis of normally distributed residuals in the ECM model is accepted.

CONCLUSION AND RECOMMENDATIONS

This study investigated the effect of income inequality on poverty in Nigeria from 1985-2022. With the utilization of data on poverty incidence, Gini index, misery index and human development index from the Standardized World Income Inequality Database (SWIID), United Nations Development Programme (UNDP), World Bank - World Development Indicator, Nigeria's apex bank and the used of Co-integration and ECM techniques of econometrics to analyze the data so as to know the association that exist among the variables. The regression result revealed that income inequality has positive and insignificant relationship with poverty incidence in Nigeria. At the same time, misery index and human development index have positive and significant relationship with poverty incidence in Nigeria. Based on the empirical result, this study concluded that, income inequality has increased the incidence of poverty in Nigeria but the rate of increase is not significant during the period of study. This is illuminating since poverty and inequality in Nigeria result from the improper use, misallocation, and misappropriation of resources rather than a lack of them. The underlying cause is a culture of rent-seeking and corruption, along with political elites who are disconnected from the problems that ordinary Nigerians face on a daily basis. Based on findings, the study recommended that government should avoid ill-use, misallocation and misappropriation of resources (wealth). It (government) should also strive to ensure a more equitable distribution of wealth, which will effectively lessen income inequality and incidence of poverty in Nigeria. Government should initiate and implement welfare policies that will help to reduce income inequality and the incidence of poverty in the country. The government should develop and implement realistic employment programmes in Nigeria which in turn will help to reduce income inequality and poverty incidence. Moreover, it is clear that the subject matter of this study is by no means exhausted in this paper. Therefore, further studies should extend the time frame covered by this study and focus on the effect of income inequality on economic growth in Nigeria.

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