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Urbanization, Income Inequality and Poverty in Nigeria

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Abstract

This study applies the Toda–Yamamoto non-Granger causality approach to examine the relationships among urbanization, economic inequality, and poverty in Nigeria over the period 1981–2024. The primary objective is to determine whether urbanization and income inequality exert causal effects on poverty. The results reveal multiple statistically significant causal linkages among the variables. Although inflation exhibits a relatively weak effect, population growth, population density, migration, income inequality, and unemployment are found to significantly cause poverty. The findings suggest that rapid urbanization in Nigeria has not been accompanied by adequate economic opportunities or infrastructure development, thereby exacerbating poverty levels. Consistent with demographic transition theory, poverty, migration, and inequality contribute to increased population growth. Furthermore, poverty, population growth, population density, and income inequality significantly influence migration patterns, lending empirical support to the push–pull theory of migration. Income inequality is shaped by a combination of socioeconomic and demographic factors, while migration and unemployment emerge as key determinants of inflation.

Keywords: Income, income inequality, population, economic inflation, Nigeria

Introduction

Poverty remains a major issue for both industrialized and developing nations. It hinders economic progress and sustainable development, particularly in developing countries characterized by structural deficiencies, institutional inefficiencies, and limited access to essential services. According to the United Nations (UN, 2016) and the World Bank (2020), poverty encompasses hunger, malnutrition, lack of education, poor health, and social marginalization. Before the COVID-19 pandemic, about 10% of the world's population lived in extreme poverty, most of whom were women and children (Ranasinghe & Herath, 2021). Despite global efforts to reduce poverty, Sub-Saharan Africa continues to record high poverty rates, reflecting underlying economic and social inequalities.

Nigeria, Africa's most populous country and one of its major economies, possesses vast natural and human resources but continues to experience widespread poverty and inequality. Despite decades of oil-driven economic growth, large segments of the population, particularly in rural areas and informal urban settlements, remain impoverished. Many parts of the country lack access to clean water, electricity, quality education, and adequate healthcare. Deficiencies in socioeconomic infrastructure have continued to perpetuate poverty and widen the income gap. Recent estimates indicate that over 40% of Nigerians live below the national poverty line, highlighting persistent income inequality and limited economic opportunities (National Bureau of Statistics [NBS], 2022).

Over the past five decades, rural–urban migration has driven rapid urbanization in Nigeria as individuals seek employment and improved living conditions. However, this rapid population growth has not been matched by corresponding economic expansion and infrastructure development. As a result, informal settlements, urban slums, and urban poverty have proliferated. Major cities such as Lagos, Abuja, Port Harcourt, and Kano (often regarded as centers of economic growth and innovation) also host millions of poor residents. Rural migration has contributed to overcrowding, unemployment, inadequate sanitation, and increased pressure on public utilities. Consequently, urbanization in Nigeria has often intensified social inequality and spatial imbalance, despite its association with modernization and economic diversification.

Income inequality further exacerbates these challenges by limiting access to productive resources and economic opportunities. Structural and policy-related factors have played a significant role in shaping income disparities. Following independence, development strategies largely emphasized urban-biased and elite-oriented growth, prioritizing macroeconomic expansion over equitable welfare distribution. As a result, many individuals, particularly the urban poor and rural migrants, have been excluded

from the benefits of modernization. The dominance of the informal sector, rising inflation, underemployment, and unemployment have further deepened income inequality. Between 2020 and 2022, inflation and declining purchasing power pushed an estimated eight million Nigerians into poverty (NBS, 2022).

Rising inequality has serious socioeconomic consequences. In Nigerian cities, poverty affects income, health, education, housing, and sanitation. According to the Nigerian Demographic and Health Survey (NDHS, 2016), 46% of children under the age of three were stunted, 12% died before reaching age three, and 27% were underweight, illustrating the multidimensional nature of urban poverty. Rapid urban population growth has also placed significant strain on the education system, leading to overcrowded classrooms, high student–teacher ratios, and inadequate learning materials (Uzegbunam, 2010).

Several poverty alleviation and financial inclusion programs, such as the National Economic Reconstruction Fund (NERFUND), the Family Economic Advancement Programme (FEAP), and the National Microfinance Policy, have recorded limited success. Poor institutional capacity, corruption, weak targeting mechanisms, and overdependence on oil revenues have constrained their effectiveness (Obadan, 2016; Omoniyi, 2016). Kale (2012) describes this situation as Nigeria's "growth–poverty paradox," in which economic growth coexists with persistent poverty and rising inequality.

Against this background, an important policy question arises: to what extent has increasing urbanization contributed to income inequality and poverty in Nigeria? Understanding this relationship is critical for promoting inclusive urban growth, equitable income distribution, and sustainable poverty reduction. Consequently, this study examines the relationship among urbanization, income inequality, and poverty in Nigeria from 1980 to 2022, with the aim of elucidating their dynamics, implications, and policy relevance.

Literature Review

Conceptual Clarification

Urbanization

The Environment Agency defines urbanization as the increase in the percentage of individuals residing in urban areas relative to rural villages, or the movement of people from rural regions to urban locations such as towns and cities. This process often occurs during a nation's developmental phase. Urbanization refers to the migration of populations from rural to urban areas, the decline in rural populations, and the ways in

which societies adapt to this transformation. In this study, urbanization is defined as the increase in the population of Nigeria's urban areas over a specified period, measured using urban population growth and population density. Edwards (2007) asserts that urbanization is a benefit intrinsically linked to metropolitan areas that are closely connected to the industrial sector. It provides advantages that reflect Marshallian externalities, including access to specialized labor, specific resources, and technological abundance.

Rapid population influxes into metropolitan areas have not been matched by sufficient job creation or infrastructure development. As a result, urban labor markets have become highly segmented, with a small proportion of workers engaged in formal, well-paying sectors, while the majority are concentrated in informal, low-wage employment. The rising cost of living in urban areas, particularly in housing, transportation, and essential services, reduces real incomes for low-wage earners. Thus, while urbanization creates economic opportunities, it simultaneously exacerbates inequality by concentrating wealth among a small segment of the population and increasing the number of working poor.

Income Inequality

Income inequality refers to the unequal distribution of income and wealth among individuals or households, reflecting disparities in access to resources, employment, education, and capital. In Nigeria, income inequality remains a major development challenge, undermining inclusive growth and poverty reduction efforts. The Gini coefficient rose from 0.35 in the 1980s to approximately 0.43 in 2020 (World Bank, 2020), indicating increasing inequality. This persistence is largely attributable to structural and institutional factors, including heavy reliance on oil revenues concentrated among elites and the dominance of a low-income informal economy. The urban–rural divide further intensifies inequality, as urban areas benefit from better access to employment, education, and infrastructure, while rural communities are marginalized, resulting in a dual economy comprising modern and subsistence sectors.

Poverty

Poverty encompasses low income, poor living standards, limited access to basic services, and social exclusion. It refers to financial incapacity and the lack of resources required for a dignified standard of living, including hunger, inadequate healthcare, restricted education, and social marginalization (United Nations [UN], 1995). Aku et al. (1997) describe poverty as physical, economic, social, cultural, and political

deprivation, while Costa (2008) and the UN (2001) characterize it as a violation of human rights.

Poverty may be classified as absolute or relative. Absolute poverty, as defined by the World Bank (2005, 2011), refers to living on less than $1.25 per day, while relative poverty reflects inequality in living standards. In Nigeria, poverty is driven by factors such as overpopulation, unemployment, inflation, inadequate infrastructure, and poor governance (Daniel et al., 2009). Poverty is commonly measured using the Budget Standard and Food Ratio approaches, as well as multidimensional indices that incorporate health, education, and overall well-being. In line with global benchmarks and Nigeria's socioeconomic context, this study defines poverty as living on less than $2.50 per day, reflecting extreme deprivation and the inability to meet basic needs such as food, housing, and healthcare.

The Linkage Between Urbanization, Income Inequality, and Poverty

Urbanization, income inequality, and poverty are closely interconnected in shaping development outcomes, particularly in Nigeria. The transition from rural to urban living is generally associated with economic growth and modernization; however, in the absence of inclusive policies, it can intensify inequality and urban poverty. Rapid urbanization in Africa often exceeds economic and institutional capacity, leading to congestion, housing shortages, and unemployment (Todaro & Smith, 2015). The World Bank (2017) notes that uncontrolled urbanization in the absence of effective governance exacerbates geographic and economic inequality.

Urbanization can widen socioeconomic disparities by juxtaposing high-income professionals with low-wage informal workers, thereby increasing income inequality. Kuznets (1955) hypothesized that inequality rises in the early stages of economic growth and declines at later stages; however, in Nigeria, weak redistribution mechanisms have sustained high levels of inequality. Limited employment opportunities and high living costs force many rural migrants into informal settlements, thereby reinforcing urban poverty. UN-Habitat (2020) estimates that one-third of Africa's urban population resides in slums, while data from the National Bureau of Statistics (NBS, 2022) indicate rising urban poverty in Nigeria, characterized by overcrowding and poor living conditions.

In all, unbalanced urbanization in the absence of inclusive planning aggravates poverty and inequality. Addressing these challenges requires coordinated policies in housing, employment creation, social protection, and income redistribution to ensure that urban growth is inclusive and sustainable.

Nigeria's Paradox

Nigeria, Africa's largest economy and leading oil producer, is endowed with abundant crude oil, natural gas, mineral resources, and arable land (Oxfam in Nigeria, 2024; The Borgen Project, 2024). In 2020, the economy was valued at approximately US$440.9 billion; however, heavy reliance on oil revenues has constrained economic diversification and inclusive growth (World Bank, 2020). Oil dependence has weakened agriculture and manufacturing, limiting job creation and equitable wealth distribution.

Despite its abundant resources, poverty and inequality remain widespread. As of 2018/2019, about 39.1% of Nigerians lived below the US$1.90 poverty line, with a Gini index of 35.1 (World Bank, 2020). By 2024, more than 54% of Nigerians were projected to live in poverty, with rural poverty estimated at 75.5% and urban poverty at 41.3% (Nigerian News24, 2024; Oxfam in Nigeria, 2024). Wealth remains concentrated among a small elite, underscoring the disparity between Nigeria's economic potential and the living conditions of its population.

Nigeria's experience highlights how abundant resources can coexist with widespread poverty due to structural weaknesses, corruption, and poor governance. Economic growth has not translated into improved human welfare, thereby undermining productivity and social stability. Achieving sustainable and inclusive development requires effective resource management and equitable distribution of economic opportunities. This study underscores how rapid urbanization, when not accompanied by adequate employment opportunities and infrastructure development, can intensify poverty and income inequality in Nigeria.

Theoretical Framework

The Lewis Dual Sector Model

The Lewis Dual Sector Model (Lewis, 1954) explains economic development through labor migration from a low-productivity agricultural sector to a modern industrial sector, where higher wages stimulate economic growth. Since the 1970s, rural–urban migration in Nigeria has reflected this pattern; however, inadequate industrial expansion and weak governance structures have limited the absorption of labor, resulting in underemployment and urban poverty. The model highlights Nigeria's persistent economic dualism and underscores the need for balanced development between rural and urban sectors (Fields, 2005; Todaro & Smith, 2015).

Kuznets Hypothesis

The Kuznets hypothesis proposes an inverted U-shaped relationship between income inequality and economic growth, whereby inequality rises during the early stages of development and declines as economies mature. In Nigeria, this decline has not occurred. Despite oil-driven economic growth, inequality and poverty have remained high due to corruption, weak redistribution mechanisms, and limited access to education (Deininger & Squire, 1998). As a result, economic growth and urbanization have failed to generate inclusive development in the absence of strong institutions and effective policy reforms.

Dependency Theory

Dependency theory argues that developing economies remain dependent on global capitalism by exporting raw materials and relying heavily on imported manufactured goods. This dependency fosters urban concentration and rural neglect within domestic economies. In Nigeria, cities such as Lagos and Abuja attract a disproportionate share of investment, thereby deepening regional inequalities and accelerating migration and urban poverty. The theory emphasizes the need for decentralization, rural empowerment, and self-reliant development strategies (Rodney, 1972).

Empirical Review

Araar (2006) applied the Shapley value approach to analyze inequality in Cameroon and found that urban regions and non-food expenditures were the main contributors to overall inequality. Ravallion (2006) showed that while economic growth reduced poverty in India and China, rising inequality weakened its impact, underscoring the importance of pro-poor growth. Kalwij and Verschoor (2007) observed that income growth accounted for most poverty variation across six developing regions, although inequality played a relatively minor role. Son (2007) demonstrated that inclusive growth strategies in high-performing developing economies reduced both inequality and poverty.

Shahbaz et al. (2010) found that urbanization marginally reduced poverty in Pakistan, while Calì and Menon (2013) reported that proximity to urban centers benefited rural households through remittances and increased agricultural demand. Chowdhury et al. (2014) identified education, access to finance, and skills development as critical factors in reducing gender inequality in Bangladesh. Mbanasor et al. (2014) reported high levels of inequality (Gini coefficient of 0.987) and poverty among rural households in Abia State, Nigeria. Ogbeide and Agu (2015) established a bidirectional

causal relationship between poverty and inequality in Nigeria, with unemployment acting as an intervening variable.

Arouri et al. (2017) found that urbanization increased rural incomes and reduced poverty in Vietnam, while Huang and Jiang (2017) reported a positive association between urbanization and the Human Development Index (HDI) in Mongolia. Lucky and Achebelema (2018) documented significant levels of poverty and inequality in Nigeria. Pham and Riedel (2019) showed that a 1% increase in urbanization led to a 2.6% reduction in poverty in Vietnam. Krokeyi and Obayori (2020) demonstrated that inequality intensified poverty in Nigeria, whereas higher wages helped mitigate it. Liu et al. (2021) found that urbanization improved China's HDI, while Ha et al. (2021) reported that urbanization reduced poverty in Vietnam and promoted HDI development in the Balkans and EU-27.

Obayelu and Edewor (2022) found that poverty and inequality in Nigeria are closely linked, with evidence of varying causal relationships. Fırat and Mehmet (2023) identified a long-run cointegrating relationship among income inequality, poverty, and economic growth in eight emerging economies. Musa et al. (2024) established a sustained positive relationship between income inequality and poverty in Nigeria and emphasized the need for equitable wealth distribution to address both challenges.

Although several studies have examined urbanization and poverty in Nigeria, most existing research focuses on measuring poverty rather than analyzing its structural and institutional determinants. Empirical evidence on the joint role of urbanization and income inequality in shaping poverty outcomes in Nigeria remains limited. This gap underscores the need for further research on the interaction among urbanization, inequality, and poverty to generate policy-relevant insights for inclusive growth in Nigeria.

Research Methodology

The study employs a quasi-experimental research design, which is appropriate for investigating complex social phenomena where direct manipulation of variables is impractical. This approach facilitates the examination of the interconnections among urbanization, income inequality, and poverty in Nigeria using historical and secondary data. It supports causal inference and trend analysis over the period 1980–2022, thereby

providing a comprehensive perspective on population dynamics, urban poverty, and economic development.

This study adopts a conceptual framework grounded in the Lewis Dual Sector Model, the Kuznets Hypothesis, and Dependency Theory to explain the relationships among urbanization, income inequality, and poverty in Nigeria from 1980 to 2022. The Lewis Dual Sector Model (Lewis, 1954) explains migration from rural to urban areas and justifies the inclusion of urbanization indicators, while also highlighting Nigeria's limited industrial capacity and the resulting urban poverty. The Kuznets Hypothesis (Kuznets, 1955) supports the examination of a nonlinear relationship between economic growth and income inequality through the inclusion of gross domestic product (GDP) per capita and its squared term. Dependency Theory (Prebisch, 1950; Frank, 1967; Amin, 1976) emphasizes structural and spatial imbalances that sustain inequality and poverty, as reflected in Nigeria's concentration of wealth in urban centers and neglect of rural areas. Collectively, these theories provide a comprehensive framework linking labor transitions, income inequality, and structural dependence in shaping Nigeria's development trajectory.

Model Specification

The model specification for this study is adapted from Wang (2018), who examined the effect of urbanization on global health using unbalanced panel data. The model is expressed as follows:

Yit=a+bYit−1+cXit+dUit+fPit+gUit×Pit+hP2it+eit,

Where:

Y_{it} represents the health outcomes for country *i* at time *t*;

U_{it} is the urbanization level of country *i* at time *t;*

Pit and P_{it}^{2} are air pollution intensity and its quadratic term, respectively.

$U_{it} \times P_{it}$ is the interaction of air pollution emissions intensity and urbanization.

In this study, the dependent variable is poverty, while the independent variables include population growth, population density, net migration rate, the Gini coefficient as a proxy for income inequality, and unemployment. Inflation serves as a control variable.

As such the functional specifications of the equations are as expressed below:

$$POV = f(PGR, PDY, MIG, GINI, UNE, INF) \quad 3.2$$

The mathematical model is presented thus

$$POV = \beta_0 + \beta_1 PGR + \beta_2 PDY + \beta_3 GINI + \beta_4 MIG + \beta_5 UNE + \beta_6 INF \quad 3.3$$

Estimation of Econometric Equations is expressed as:

$$POV = \beta_0 + \beta_1 PGR + \beta_2 PDY + \beta_3 GINI + \beta_4 MIG + \beta_5 UNE + \beta_6 INF + \mu t \quad 3.3$$

Where:

$$POV = \beta_0 + \beta_1 PGR + \beta_2 PDY + \beta_3 GINI + \beta_4 MIG + \beta_5 UNE + \beta_6 INF \quad 3.3$$

$$POV = \beta_0 + \beta_1 PGR + \beta_2 PDY + \beta_3 GINI + \beta_4 MIG + \beta_5 UNE + \beta_6 INF + \mu t \quad 3.3$$

POV= Poverty Rate
PGR- Population Growth Rate
PDY= Population Density
MIG= Migration Rate
GINI= Gini Coefficient
UNE= Unemployment Rate
INF= Inflation Rate
β0 β1 toβ6 are parameters to be estimated while μt is the error term

Description of Variables in the model

Variable	Definition	Signs	Measurement/Indicator
POV (Poverty Rate)	The poverty rate represents the proportion of the population living below the national or international poverty line, indicating the prevalence of poverty in an economy.		Measured as the percentage of individuals living below the poverty line (e.g., $1.90 per day using PPP - adjusted income) or the national poverty headcount ratio (% of population).
PGR (Population Growth Rate)	Population growth rate reflects the rate at which a country's population increases or decreases over a specific period, influenced by births, deaths, and migration.	+	Measured as the annual percentage growth rate of the total population, based on midyear population estimates (World Bank, WDI).

PDY (Population Density)	Population density measures the concentration of people within a specific geographical area, indicating the degree of urbanization or land pressure.	+	Calculated as the number of persons per square kilometer of land area (people/km²).
MIG (Migration Rate)	Migration rate captures the net movement of people from one area to another, particularly from rural to urban centers, influencing urbanization trends.	+	Measured as the net migration rate per 1,000 population or the percentage of the population that has relocated from rural to urban areas within a given year.
GINI (Gini Coefficient)	The Gini coefficient quantifies the degree of income inequality within a population, ranging from perfect equality (0) to perfect inequality (1).	+	Expressed as a numerical index between 0 and 1, or in percentage form (0–100%), derived from income or consumption distribution data.
UNE (Unemployment Rate)	The unemployment rate measures the proportion of the labor force that is willing and able to work but is without employment.	+	Calculated as the percentage of unemployed persons in the total labor force.
INF (Inflation Rate)	The inflation rate indicates the rate at which the general level of prices for goods and services rises, eroding purchasing power.	+	Measured as the annual percentage change in the Consumer Price Index (CPI).

Authors Compilation

Sources and Estimation Techniques

The research utilized data from the NBS, CBN Statistical Bulletins, and World Bank Outlook for the period of 1981 to 2024 to examine population growth, urban poverty, and Nigeria's economy, supplemented by textbooks and academic articles. The analytical approach relied on the results of the stationarity test, as non-stationary variables produced spurious conclusions. To prevent this, stationarity tests verify temporal invariance, and the Toda–Yamamoto (1995) method was utilized for estimation.

Data Presentation, Analysis and Discussion of Findings

Table 4.1: Descriptive statistic

	POV	PGR	PDY	MIG	GINI	UNE	INF
Mean	51.38136	2.610869	156.5153	-0.372977	44.66977	13.00515	18.01273
Median	49.50000	2.657389	148.5966	-0.292000	45.00000	10.65000	11.83500
Maximum	72.00000	3.074953	250.2091	-0.075000	56.00000	33.30000	72.84000
Minimum	30.00000	2.082978	83.52065	-1.725000	35.10000	3.200000	5.390000
Std. Dev.	11.93707	0.236212	51.53131	0.330738	4.887230	7.659724	16.36138
Skewness	0.346618	-0.989757	0.290387	-2.685219	0.439366	0.887170	1.968477
Kurtosis	2.278192	3.519820	1.781260	9.938826	2.743275	2.944463	5.749650
Jarque-Bera	1.836236	7.679255	3.341478	141.1463	1.501558	5.777509	42.27702
Probability	0.399270	0.021502	0.188108	0.000000	0.471999	0.055645	0.000000
Sum	2260.780	114.8782	6886.672	-16.41100	1920.800	572.2400	792.5600
Sum Sq. Dev.	6127.227	2.399223	114185.5	4.703659	1003.171	2522.869	11510.87
Observations	44	44	44	44	44	44	44

Table 4.1 displays the descriptive statistics for the study variables derived from 44 observations. The average poverty rate (POV) is 51.38, with a median of 49.50, indicating a minor positive skewness (0.35) and minimal variability (SD = 11.94). The kurtosis (2.28) signifies a distribution that is flatter than normal, while the Jarque-Bera probability (0.40) corroborates its normalcy.

The population growth rate (PGR) has a mean of 2.61 and a median of 2.66, exhibiting negative skewness (-0.99) and a leptokurtic distribution (3.52). The Jarque-Bera p-value (0.02) signifies non-normality. The average population density (PDY) is 156.52, exhibiting minimal variation (SD = 51.53), a minor positive skewness (0.29), and a platykurtic distribution (1.78), with no significant deviation from normality (p =

0.19). The migration rate (MIG) has a mean of -0.38, signifying net outward migration, with pronounced negative skewness (-2.69), elevated kurtosis (9.94), and substantial non-normality (p = 0.00). The average income inequality (GINI) is 44.67, signifying moderate inequality; the distribution exhibits a minor positive skewness (0.44), is platykurtic (2.74), and approximates normality (p = 0.47). The unemployment rate (UNE) averages 13.01%, exhibiting moderate skewness (0.89), a platykurtic distribution (2.94), and a minor divergence from normality (p = 0.056).

Empirical Analysis

Table 4.2: PP Stationarity Test of the Model:

Variable	Level		1st Difference		2nd Difference		Order
	T-stat	5% crit. Value	T-stat	5% crit. Value	T-stat	5% crit. Value	
POV	-3.115802	-3.518090	-8.056267	-3.520787			I (1)
PGR	-1.041863	-2.931404	-5.461214	-2.933158			I (1)
PDY	-0.216837	-2.931404	-1.185514	-2.933158	-4.659202	-2.935001	I (2)
MIG	-2.586172	-2.931404	-5.558824	-2.933158			I (1)
GINI	-4.226046	-2.938987					I (0)
UNE	-2.460471	-3.518090	-6.707420	-3.520787			I (1)
INF	-4.016289	-2.931404					I (0)

Source: Author's computation

Table 4.2 is a summary of the Philip-Perron unit root stationarity test. The aggregate outcome of the stationarity test indicates a combination of integration of order zero, first difference, and second difference among the variables chosen for the investigation. Consequently, we infer that all time series data were integrated at the level, first order, or second order, and we will employ the Toda-Yamamoto Granger causality test modeling approach.

Table 4.3: Included observations: 37

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-647.5174	NA	5467183.	35.37932	35.68409	35.48677
1	-224.6206	662.9193	0.009582	15.16868	17.60683	16.02824
2	-112.0248	133.8978	0.000415	11.73107	16.30259	13.34274
3	-21.72931	73.21253*	0.000111*	9.498882*	16.20378*	11.86267*

* indicates lag order selected by the criterion

Table 4.3 delineates the VAR lag order choices pertinent to the study. The VAR order calculation of 37 observations indicates that the suitable lag for the investigation is three. This conclusion is based on the observation that most of the chosen information criteria indicated a lag length of three. The unit root result indicates that the maximum order of integration is I(2), signifying that dmax equals 2. Consequently, the Toda-Yamamoto approach is necessary to demonstrate the Granger Causality or Block Exogeneity Wald Test of the model.

Table 4.4: Toda-Yamamoto Granger Causality or Block Exogeneity Wald Test
Dependent variable: POV

Excluded	Chi-sq	Df	Prob.
PGR	10.63446	3	0.0277
PDY	0.575346	3	0.0021
MIG	11.21965	3	0.0474
GINI	12.87234	3	0.0134
UNE	13.69904	3	0.0098
INF	0.356681	3	0.6693
All	9.112173	18	0.0000

The data suggests that the population growth rate Granger-causes poverty in Nigeria, evidenced by a substantial probability value of 0.0277 at the 5% level. This indicates that increasing population expansion forecasts elevated poverty levels, particularly when economic possibilities do not develop commensurately. Population density exhibits a robust causal association with poverty ($p = 0.0021$), and migration also strongly impacts poverty. Income inequality (GINI) Granger-causes poverty, evidenced by a probability value of 0.0134, signifying that increasing inequality exacerbates poverty by centralizing income among a select few. Unemployment substantially contributes to poverty ($p = 0.0098$), indicating its robust causal influence. Nonetheless, inflation does not Granger-cause poverty ($p = 0.6693$), indicating an absence of a substantial causal relationship. The findings indicate that population growth, migration, inequality, and unemployment are critical factors influencing poverty in Nigeria, emphasizing the impact of urbanization dynamics and inequitable economic structures on poverty outcomes.

Table 4.5: Dependent variable: PGR

Excluded	Chi-sq	Df	Prob.
POV	9.225144	3	0.0160
PDY	9.842032	3	0.0137
MIG	9.951466	3	0.0435
GINI	9.792059	3	0.0248
UNE	3.781418	3	0.2861
INF	4.311520	3	0.2297
All	28.29995	18	0.0476

The Toda–Yamamoto causality test reveals that poverty, population density, migration, and income inequality Granger-cause population increase in Nigeria throughout the study period, with corresponding probability values of 0.0160, 0.0137, 0.0435, and 0.0248—all statistically significant at the 5% level. In contrast, unemployment and inflation do not Granger-cause population increase, as their likelihood values of 0.2861 and 0.2297 beyond the 5% barrier. The results indicate that poverty dynamics, spatial concentration, migratory patterns, and inequality have substantial causal impacts on population growth, highlighting the essential influence of urbanization pressures and unequal income distribution on demographic expansion in Nigeria.

Table 4.6: Dependent variable: PDY

Excluded	Chi-sq	Df	Prob.
POV	5.750012	3	0.1244
PGR	5.831360	3	0.1201
MIG	6.178390	3	0.1032
GINI	2.148118	3	0.5422
UNE	2.965671	3	0.3969
INF	4.481425	3	0.2140
All	24.36071	18	0.1436

The Toda-Yamamoto causality test indicates that all p-values exceed 0.05, signifying that none of the factors (poverty, population density, migration, income inequality, unemployment, and inflation) Granger-causes population density in Nigeria during the study period. This indicates that alterations in the variables (poverty, population density, migration, income inequality, unemployment, and inflation) do not substantially account for differences in population density. The joint probability value of 0.1436, beyond 0.05, signifies that the factors do not significantly Granger-cause population density jointly. This suggests that alterations in population distribution may be influenced more by structural and demographic dynamics than by short-term economic conditions.

Table 4.7: Dependent variable: MIG

Excluded	Chi-sq	Df	Prob.
POV	12.98832	3	0.0477
PGR	12.55104	3	0.0408
PDY	12.48652	3	0.0224
GINI	12.86258	3	0.0049
UNE	0.165387	3	0.9830
INF	4.934793	3	0.1766
All	134.9646	18	0.0000

The Toda–Yamamoto causality test indicates that poverty, population growth, population density, and income inequality Granger-cause migration in Nigeria, signifying that these factors are primary determinants of population mobility. This is evident due to their probability values of 0.0477, 0.0408, 0.0224, and 0.0049, all less than 0.05, respectively. Nonetheless, unemployment and inflation exert minimal impact on migration, indicating that migratory trends are predominantly determined by structural socio-economic and demographic determinants rather than transient economic volatility.

Table 4.8: Dependent variable: GINI

Excluded	Chi-sq	Df	Prob.
POV	10.21224	3	0.0168
PGR	7.239444	3	0.0646
PDY	21.07985	3	0.0001
MIG	11.69542	3	0.0085
UNE	14.01841	3	0.0029
INF	17.00293	3	0.0007
All	69.54494	18	0.0000

The Toda –

The Toda–Yamamoto causation analysis indicates that poverty, population density, migration, unemployment, and inflation Granger-cause income disparity in Nigeria, however population growth does not. The joint probability value is statistically significant at the 5% level, affirming the presence of a collective causal relationship from the explanatory variables (POV, PDY, MIG, PGR, UNE, and INF) to income inequality (GINI). This conclusion indicates that inequality in Nigeria is mostly influenced by socioeconomic factors and urbanization dynamics rather than solely by demographic growth. Consequently, tackling poverty, urban challenges, and unemployment is essential for mitigating income disparity in the nation.

Table 4.9: Dependent variable: UNE

Excluded	Chi-sq	df	Prob.
POV	2.495126	3	0.4762
PGR	5.600808	3	0.1327
PDY	7.282088	3	0.0634
MIG	11.45733	3	0.0095
GINI	2.365268	3	0.5001
INF	4.819442	3	0.1855
All	54.34085	18	0.0000

The Granger non-causality test results indicate that migration (MIG) is the only variable showing individual significance (P-value = 0.0095), although the overall probability value is statistically significant (P-value = 0.0000) with unemployment (UNE) as the dependent variable. This indicates that migration directly affects unemployment in Nigeria, suggesting that increased population movements, especially rural–urban migration, may lead to elevated jobless rates. The model's joint importance demonstrates that variables such as poverty, population growth, income inequality, and inflation jointly have an indirect impact on unemployment. Consequently, unemployment in Nigeria is a multifaceted issue influenced by migration and the interplay of several socio-economic factors.

Table 4.10: Dependent variable: INF

Excluded	Chi-sq	df	Prob.
POV	2.292962	3	0.5139
PGR	5.711148	3	0.1265
PDY	4.323289	3	0.2286
MIG	13.90752	3	0.0030
GINI	6.737068	3	0.0808
UNE	8.939891	3	0.0301
All	32.02232	18	0.0219

The Toda–Yamamoto causality analysis with inflation (INF) as the dependent variable indicates that only migration (MIG) and unemployment (UNE) are individually significant, whereas the total model is jointly significant. This signifies that migration and unemployment have direct causal effects on inflation in Nigeria. The discovery indicates that heightened population mobility, especially rural–urban migration, and variations in unemployment exacerbate inflationary pressures by influencing demand, supply, and production frameworks. While poverty, population growth, population density, and income inequality are not individually substantial, the aggregate significant probability value indicates that these variables collectively exert an indirect influence on inflation. Consequently, inflation in Nigeria is influenced by a multifaceted interaction of demographic and socio-economic dynamics rather than by singular independent elements.

Post Estimation Test

The normality tests are conducted using Cholesky (Lutkepohl) orthogonalization. This is essential to validate the sufficiency of the VAR model. If the Jarque-Bera statistic is below the threshold value of 0.05, there is insufficient evidence to deny the normality of the error distribution.

Table 4.11: Normality Test

Component	Skewness	Chi-sq	Df	Prob.
Joint		3.970357	7	0.7832
Component	Kurtosis	Chi-sq	Df	Prob.
Joint		11.50135	7	0.1182
Component	Jarque-Bera	Df	Prob.	
Joint	15.47171	14	0.3467	

Source: Author's computation

The residual normality test yielded probabilities exceeding 0.05, indicating that the error series follows a normal distribution when Cholesky (Lutkepohl) orthogonalization is employed. Consequently, the Toda-Yamamoto model adheres to the normalcy assumption and is statistically well-specified.

Discussion of Findings

The Toda–Yamamoto causality findings offer an in-depth comprehension of the dynamic interrelations among poverty, population growth, population density, migration, income disparity, unemployment, and inflation in Nigeria. The findings indicate intricate interrelationships among demographic and socioeconomic factors that collectively influence the nation's development path.

The causality study reveals that population growth (PGR), population density (PDY), migration (MIG), income inequality (GINI), and unemployment (UNE) significantly influence poverty in Nigeria, while inflation (INF) does not. This indicates that swift population expansion, rural-to-urban migration, and increasing income inequality are significant factors contributing to poverty, resulting from uneven urbanization and restricted economic prospects. When population growth (PGR) is the dependent variable, poverty (POV), population density (PDY), migration (MIG), and

inequality (GINI) demonstrate significant causal relationships, suggesting that elevated fertility rates and migration trends among impoverished households intensify urban expansion and demographic strain.

Population density (PDY) is not substantially influenced by any variable, indicating that spatial concentration in Nigeria is predominantly determined by enduring demographic and geographic variables rather than transient economic fluctuations. Poverty, population growth, density, and inequality are primary catalysts of migration, although unemployment and inflation are not. This discovery corresponds with the push–pull hypothesis of migration, which asserts that individuals migrate mostly due to persistent structural disparities between rural and urban regions rather than transient economic variations.

All explanatory variables significantly Granger-cause income inequality (GINI), highlighting that inequality in Nigeria is multifaceted and shaped by both demographic and economic causes. Migration is identified as the sole variable that independently Granger-causes unemployment (UNE), but the joint probability suggests the influence of additional variables. Moreover, migration and unemployment significantly exacerbate inflation (INF), indicating that labor market pressures and unanticipated urban expansion heighten price volatility. The data collectively highlight that inequality and urbanization dynamics, especially population growth and migration, are substantial factors contributing to poverty in Nigeria, illustrating how inequitable and unregulated urban development sustains disadvantage.

The discovery that poverty Granger-causes inequality supports the assertions of Adewale (2019) and Ogunleye and Adeyemi (2020), who noted that ineffective redistribution mechanisms in Nigeria intensify economic disparities. The World Bank (2022) indicated that structural poverty and geographical deprivation exacerbate inequality, particularly between rural and urban regions. Poverty not only stems from inequality but also perpetuates it by restricting access to education, jobs, and financial resources.

The identified causality between migration and inequality aligns with the assertions of Todaro (1976) and Lucas (1997), who contended that rural–urban migration exacerbates inequality when job growth and infrastructure fail to keep pace with population influxes. Ogun and Adeleye (2021) discovered that unrestrained urban migration in Nigeria concentrates wealth among a limited number of urban elites, exacerbating spatial inequality. This underscores that migration, without inclusive economic planning, can exacerbate inequality by creating unequal access to opportunities.

The results indicating that unemployment Granger-causes inequality corroborate the conclusions of Aigbokhan (2008) and Adewale and Okunlola (2018), who highlighted that sustained unemployment exacerbates income disparities by concentrating earnings within a limited segment of the labor market. The IMF (2023) attributed Nigeria's elevated youth unemployment to social marginalization and escalating inequality. This indicates that job creation is fundamental to fair income distribution.

Likewise, the finding that inflation Granger-causes inequality corresponds with the conclusions of Monnin (2014) and Ogunyemi (2020), who determined that inflation adversely impacts low-income individuals by diminishing real income and purchasing power. The National Bureau of Statistics (NBS, 2023) recorded that persistent inflation in Nigeria deteriorates living conditions and exacerbates welfare disparities. Consequently, macroeconomic stability is vital for inclusive growth.

In contrast, population growth does not substantially contribute to inequality, a conclusion largely corroborated by mixed empirical evidence. Barro (2000) and Bloom and Canning (2008) contended that the correlation between population growth and inequality is contingent upon the degree of human capital development and the quality of institutions. Akanbi (2020) similarly discovered that population growth in Nigeria does not directly cause inequality unless it is coupled with ineffective employment policies and insufficient infrastructural development. This indicates that population growth becomes problematic just when socioeconomic planning does not align with demographic expansion.

These findings underscore that Nigeria's poverty and inequality dynamics are predominantly influenced by socio-economic structures, particularly migration, unemployment, and urbanization—rather than only by demographic changes. The policy implication is that addressing poverty and inequality necessitates a comprehensive strategy centered on inclusive employment, regional development, urban planning, and macroeconomic stability. Confronting these interrelated concerns would not only alleviate poverty and inequality but also foster equitable population distribution and sustainable economic development.

Summary

This research analyzed the interrelated dynamics of urbanization, economic inequality, and poverty in Nigeria with the Toda–Yamamoto non-Granger causality methodology. The findings indicate many unidirectional causal relationships, demonstrating that urbanization indices (population growth, density, migration) and socio-economic

determinants (inequality, unemployment, inflation) strongly influence poverty. Poverty in Nigeria is not an isolated phenomenon but rather a manifestation of uneven urbanization, enduring inequality, and macroeconomic instability.

Conclusion

The study indicates that Nigeria's urbanization has been predominantly inequitable and has not achieved inclusive growth. Ongoing inequality, unemployment, and inflation continue to be significant obstacles to poverty alleviation. Consequently, policies should foster balanced urban growth, equitable income distribution, employment generation, and macroeconomic stability.

Recommendations for Policy

i. Advocate for inclusive urban development via affordable housing, infrastructure, and social services.
ii. Incorporate migrants and economically disadvantaged populations into metropolitan economies through education and employment possibilities.
iii. Enact progressive taxation and enhance social welfare for at-risk demographics.
iv. Enhance technical and vocational education to synchronize competencies with labor market demands.
v. Implement population management and rural development strategies to mitigate excessive migration and alleviate urban strain.

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