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Population Growth and Unemployment in Nigeria (1990-2024)

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Abstract

Nigeria's population has more than doubled since 1990, while its unemployment rate has fluctuated sharply rather than following a steady trend, raising the question of whether population growth is a significant driver of unemployment. This study examines the trend, long-run and short-run relationship, and direction of causality between population growth and unemployment in Nigeria over the period 1990–2024, controlling for real GDP growth, inflation and urbanization. Annual data were sourced from the World Bank World Development Indicators and analysed using the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration, alongside the Pairwise Granger Causality Test. Unit root tests showed that unemployment, population growth, inflation and urbanization were integrated of order one, while real GDP growth was stationary at level, satisfying the pre-condition for ARDL estimation. The bounds test indicated a long-run relationship among the variables at the 10% level, reinforced by a negative and highly significant error correction term (−0.468), implying that about 47% of short-run disequilibrium is corrected within a year. Contrary to the Malthusian expectation, population growth had a negative and statistically insignificant long-run effect on unemployment, whereas real GDP growth had a negative and significant effect, consistent with Okun's Law. However, the Granger causality test revealed a statistically significant, unidirectional causal relationship running from population growth to unemployment. The study concludes that population growth does not exert an immediate, proportional effect on unemployment but is nonetheless a genuine, lagged causal driver of it, and recommends that employment-intensive growth policies be pursued alongside human-capital investment targeted at Nigeria's expanding labour force.

Keywords: population growth; unemployment; ARDL bounds test; Granger causality; Nigeria

JEL Classification: J11, J64, C22

1. Introduction

Population growth remains one of the most important demographic issues affecting developing economies, particularly in Sub-Saharan Africa. Nigeria is ranked first in Africa and sixth globally in population size, with its population rising from approximately 95 million in 1990 to over 223 million in 2023 (World Bank, 2024c). This continuous expansion has significant implications for labour-market conditions, especially unemployment. In economic theory, population growth is not necessarily problematic:

Endogenous Growth Theory (Romer, 1990) argues that a larger population can expand the stock of human capital and innovation, supporting growth when matched by appropriate institutions and investment. The Malthusian Theory of Population (Malthus, 1798), by contrast, holds that population expands faster than the resources and employment opportunities needed to sustain it, so that unemployment arises when labour-force growth outpaces the economy's capacity to create productive jobs. Whether population growth helps or harms an economy is therefore an empirical, not a purely theoretical, question.

Nigeria's population growth rate has itself declined gradually, from about 2.7% in 1990 to approximately 2.1% by 2024, even as the absolute size of the population, and hence the number of potential labour-market entrants, has continued to expand. Unemployment, meanwhile, has not followed a similarly steady path: the National Bureau of Statistics reported a rise from 23.1% in the third quarter of 2018 to 27.1% in the second quarter of 2020, with youth unemployment rising from 29.7% to 34.9% over the same period (NBS, 2020). This divergence, a gradually declining population growth rate alongside sharply fluctuating unemployment, raises the central question addressed in this study: does population growth significantly influence unemployment in Nigeria, and if so, through what dynamic and causal channels?

Existing empirical studies on the relationship have produced mixed findings. Some (e.g., Ammani et al., 2023; Dauda, 2024) report that population growth significantly increases unemployment, while others (e.g., Olabiyi et al., 2024) find a more conditional, non-uniform effect. Most of these studies, however, model unemployment as a function of population growth alone, without adequately controlling for other macroeconomic determinants, leaving open the possibility of omitted-variable bias. This study addresses that gap by examining the relationship between population growth and unemployment in Nigeria from 1990 to 2024 while controlling for real GDP growth, inflation, and urbanization, using the Autoregressive Distributed Lag (ARDL) bounds testing approach and the Pairwise Granger Causality Test.

The broad objective of the study is to examine the impact of population growth on unemployment in Nigeria from 1990 to 2024. Specifically, the study examines the trends of population growth and unemployment in Nigeria; determines the long-run and short-run effect of population growth on unemployment; and examines the causal relationship between the two variables. Correspondingly, the study tests two null hypotheses: H_{01}, that there is no significant relationship between population growth and unemployment in Nigeria; and H_{02}, that there is no significant causal relationship between population growth and unemployment in Nigeria. The study is significant to policymakers responsible for labour, employment and population management; to economic planners; and to the academic literature, to which it contributes updated, ARDL-based evidence covering a period that includes the structural effects of the 2020 pandemic-induced recession.

2. Literature Review

2.1 Conceptual Review

Population growth refers to the sustained increase in the number of people living within a defined area over time, driven by the interaction of fertility, mortality and migration (Bloom, Canning, & Sevilla, 2003). Beyond numerical expansion, it also captures structural shifts in age composition and spatial distribution: Nigeria's population is heavily youthful, with a large share under age 30 (UN DESA, 2024), which increases the proportion of people entering working age and expands labour-supply pressure. Unemployment, in turn, exists when individuals willing and able to work at prevailing wages are unable to secure paid employment (ILO, 2023), and is commonly disaggregated into frictional, structural, cyclical and seasonal types (Jhingan, 2011). In Nigeria, unemployment is shaped more by structural constraints, a limited formal-sector absorption capacity alongside a large, low-productivity informal sector, than by short-term cyclical fluctuations (NBS, 2023; ILO, 2024). Two further concepts serve as control variables in the model specified

in Section 3: real GDP growth, the standard measure of output expansion through which labour demand is created (Jhingan, 2011), and urbanization, the share of the population residing in urban areas, which affects the size of the urban labour force independently of the national population growth rate (UN DESA, 2024). Nigeria's urban share rose from about 30.4% in 1990 to 53.9% in 2023, one of the fastest urban transitions in Sub-Saharan Africa.

2.2 THEORETICAL REVIEW

Four theories inform this study. The Malthusian Theory of Population (Malthus, 1798) holds that population grows geometrically while subsistence resources grow only arithmetically, so that an expanding labour force eventually outpaces the economy's job-creating capacity, manifesting as unemployment. The Keynesian Theory of Employment (Keynes, 1936) instead attributes unemployment primarily to insufficient aggregate demand rather than labour oversupply, tying employment outcomes to investment, government expenditure and consumption. The Lewis Dual-Sector Model (Lewis, 1954) explains structural imbalance as a transition process between a low-productivity traditional sector and a capital-intensive modern sector whose pace of expansion is often too slow to absorb continuous labour inflows. The Endogenous Growth Theory (Romer, 1986) offers a more optimistic view, in which a growing population contributes positively to output when matched by adequate investment in human capital and innovation, but places pressure on job opportunities where such investment is weak.

This study is anchored on the Malthusian theory, which provides the clearest structural explanation for why an expanding labour force might outpace Nigeria's job-creating capacity. Applying the theory to Nigeria suggests several mechanisms of persistent unemployment: formal-sector employment has expanded at under 1% annually in many years, far below population growth of 2.5–3% (NBS, 2023; UN DESA, 2024); fertility remains high (about 5.1 births per woman in 2023), so that an estimated 5–6 million young Nigerians enter the labour market annually, far exceeding new formal jobs created (NBS, 2023; UNFPA, 2025); the manufacturing sector contributes less than 10% of GDP, limiting the modern sector's capacity to absorb surplus labour (World Bank, 2024c); and rapid urbanization, driven by rural–urban migration in the pattern described by the Harris-Todaro Model (Harris & Todaro, 1970), has outpaced urban formal job creation, intensifying congestion and underemployment in cities such as Lagos, Abuja and Port Harcourt. The framework also helps explain Nigeria's episodes of "jobless growth" (Aderemi et al., 2022), in which positive GDP growth, concentrated in capital-intensive sectors such as oil and gas, has failed to reduce unemployment because it generates few jobs per unit of output.

2.3 Empirical Review

Empirical evidence on the population–unemployment relationship in Nigeria is mixed. Using ARDL techniques, Ammani et al. (2024) and Dauda (2024) both found that population growth significantly increases unemployment in the short and long run, a result reinforced by Rabiu et al. (2019) using Dynamic OLS. By contrast, Olabiyi et al. (2024), also using ARDL, found a conditional effect in which population growth increases unemployment in the short run but reduces it in the long run, suggesting the relationship depends on structural adjustment and labour-absorption capacity. Studies focused on macroeconomic inefficiency reinforce the structural interpretation: Aderemi et al. (2022) documented jobless growth in Nigeria using ARDL and ECM techniques, while Oniore et al. (2023) found that inflation and growth interact to weaken expected employment gains. Youth-focused studies (Adebayo, 2021; Omoju et al., 2023) similarly find that unemployment, especially among young people, persists despite policy interventions, pointing to a structural rather than purely cyclical problem. Earlier contributions (Onwioduokit, 2013; Nwaka et al., 2015; Ojapinwa & Lawanson, 2016) established that Nigerian unemployment is structurally

rooted and predates recent demographic pressures, while cross-country evidence from South Asia (Rahman, 2022) and Ethiopia (Tadesse, 2021) suggests the population–unemployment relationship is a broader developing-economy phenomenon. More recent studies (Job, 2023; Otu et al., 2025) introduce a moderating perspective, showing that the effect of population growth on unemployment interacts with GDP, foreign direct investment and institutional quality rather than operating uniformly.

Although these studies collectively establish that population growth and unemployment are related in Nigeria, most model the relationship directly, without adequately controlling for broader macroeconomic conditions, and produce results that vary considerably with model specification and estimation technique. This study addresses that gap by examining the relationship while jointly controlling for real GDP growth, inflation and urbanization, providing a more complete and updated empirical account of the population–unemployment nexus in Nigeria.

3. METHODOLOGY

3.1 Research Design and Data

This study adopts an ex-post facto, quantitative time-series research design, appropriate because it relies on historical secondary data without direct manipulation of the variables. Annual data covering Nigeria over the period 1990–2024 were obtained principally from the World Bank World Development Indicators, complemented where necessary by the National Bureau of Statistics. The variables are the unemployment rate (UNEMP, % of total labour force), population growth rate (POP, annual %), real GDP growth rate (GDP, annual %), inflation rate (INF, annual %) and urbanization rate (URB, % of total population). This period was selected because it captures Nigeria's major demographic and labour-market changes, including the structural effects of the 2020 pandemic-induced recession.

3.2 Model Specification

This study adapts and extends the empirical framework of Ammani et al. (2023) and Olabiyi et al. (2024), who modelled unemployment as a function of population growth (or its proxies) alone. To reduce the risk of omitted-variable bias and capture additional channels through which unemployment is determined, this study augments the base specification with three control variables, real GDP growth, inflation and urbanization, drawn respectively from Keynesian Employment Theory, the Phillips Curve Hypothesis, and the Harris-Todaro Migration Model. The general implicit functional model is specified as:

$$UNEMP_t = f(POP_t, GDP_t, INF_t, URB_t) \quad (3.1)$$

and the corresponding stochastic (econometric) model as:

$$UNEMP_t = \beta_0 + \beta_1 POP_t + \beta_2 GDP_t + \beta_3 INF_t + \beta_4 URB_t + \mu_t \quad (3.2)$$

where β_0 is the intercept, β_1–β_4 are the parameters to be estimated, and μ_t is a white-noise disturbance term. Population growth (POP) is expected to relate positively with unemployment, consistent with the Malthusian prediction. Real GDP growth (GDP) is expected to relate negatively with unemployment, in line with Keynesian theory and Okun's Law (1962). Inflation (INF) is expected to carry an ambiguous sign,

reflecting the unsettled Phillips Curve trade-off in developing economies. Urbanization (URB) is expected to relate positively with unemployment, consistent with the Harris-Todaro model.

3.3 Estimation Technique

The study adopts the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration developed by Pesaran, Shin and Smith (2001). ARDL is well suited to this study because it accommodates a mixture of I(0) and I(1) variables, provided none is integrated of order two; it produces robust and efficient long-run estimates even in small samples such as the 35 annual observations used here; and it estimates short-run dynamics and the long-run equilibrium relationship within a single-equation framework. A pre-estimation Augmented Dickey-Fuller (ADF) unit root test was first conducted on all series to confirm that none is I(2). The unrestricted error-correction representation of the ARDL(p, q1, q2, q3, q4) model is specified as:

$$\Delta UNEMP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta UNEMP_{t-i} + \sum_{i=0}^{q1} \alpha_{2i} \Delta POPG_{t-i} + \sum_{i=0}^{q2} \alpha_{3i} \Delta GDPG_{t-i}$$

$$+ \sum_{i=0}^{q3} \alpha_{4i} \Delta INF_{t-i} + \sum_{i=0}^{q4} \alpha_{5i} \Delta URB_{t-i} + \lambda_1 UNEMP_{t-1}$$

$$+ \lambda_2 POPG_{t-1} + \lambda_3 GDPG_{t-1} + \lambda_4 INF_{t-1} + \lambda_5 URB_{t-1} + \varepsilon_t \qquad (3.3)$$

where Δ is the first-difference operator, α1i–α5i are short-run dynamic coefficients, and λ1–λ5 are long-run multipliers tested in the bounds test, with the null hypothesis of no cointegration (λ1 = λ2 = λ3 = λ4 = λ5 = 0) evaluated against the Pesaran et al. (2001) critical value bounds. Where cointegration is established, the long-run model and the short-run error correction model (ECM), incorporating the lagged error correction term (ECT_{8-1}) with coefficient η, are estimated; a negative and statistically significant η confirms convergence toward long-run equilibrium. To determine the direction of causality between the variables, a Pairwise Granger Causality Test was conducted based on the bivariate vector autoregressive framework, illustrated for UNEMP and POP as:

$$UNEMP_t = \Sigma \alpha_i UNEMP_{t-i} + \Sigma \beta_j POP_{t-j} + u1t \quad \text{and} \quad POP_t = \Sigma \gamma_i POP_{t-i} + \Sigma \delta_j UNEMP_{t-j} + u2t \qquad (4)$$

with the same bivariate structure applied to each remaining pair of variables. Finally, the model's adequacy was assessed using the Breusch-Godfrey LM test for serial correlation, the Breusch-Pagan-Godfrey test for heteroskedasticity, the Jarque-Bera test for normality, and the CUSUM and CUSUMSQ tests of Brown, Durbin and Evans (1975) for parameter stability. All estimations were carried out in EViews 9.

4. Results and Discussion

4.1 Trend of the Variables

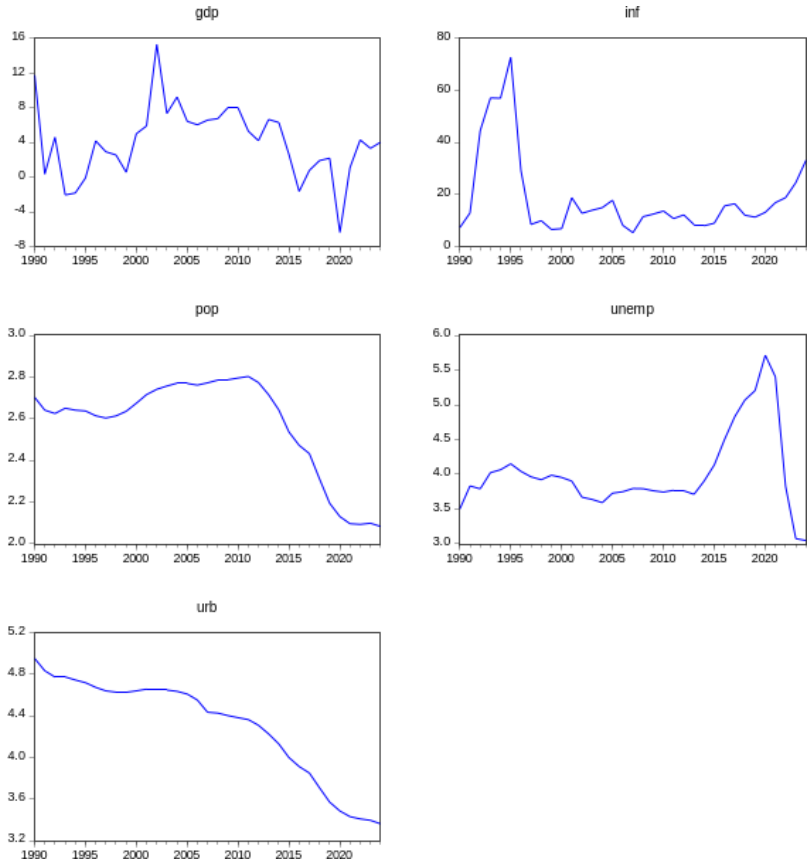


Figure 1: Trend of GDP, INF, POP, UNEMP and URB (1990–2024)

Source: Author's computation using EViews 9 (2026).

Figure 1 plots UNEMP, POP, GDP, INF and URB over 1990–2024. GDP fluctuates around a broadly constant mean of about 4%, with a sharp contraction in 2020 associated with the COVID-19 recession, showing no obvious long-term trend. INF displays a similar mean-reverting pattern but with far greater volatility, spiking above 70% in the mid-1990s before settling into single digits through the 2000s and drifting upward again after 2015. POP follows a smooth, hump-shaped trajectory, rising gradually from the early 1990s to a peak around 2011 before declining steadily to about 2.1% by 2024. UNEMP remained relatively stable and low through the 1990s and 2000s before rising sharply from about 2015 to a peak close to 5.7% around 2020, then falling sharply toward the end of the series. URB shows a clear and persistent downward trend across the entire period. Because POP and URB show sustained trending behaviour while GDP and INF appear to fluctuate around a constant mean, and because unemployment rose sharply well after population growth had begun to decline, formal unit root testing and a causality investigation were required rather than relying on visual trend comparison alone.

4.2 Descriptive Statistics

Table 1: Descriptive Statistics

	GDP	INF	POP	UNEMP	URB
Mean	4.081086	18.70554	2.573457	4.015286	4.300829

	GDP	INF	POP	UNEMP	URB
Median	4.230000	13.00700	2.641000	3.831000	4.434000
Maximum	15.32900	72.83600	2.803000	5.714000	4.949000
Minimum	-6.369000	5.388000	2.083000	3.045000	3.363000
Std. Dev.	4.151780	15.86940	0.237244	0.583666	0.486810
Skewness	0.106522	2.071452	-1.133074	1.328307	-0.787481
Kurtosis	3.822425	6.495707	2.855030	4.602681	2.223165
Jarque-Bera	1.052581	42.85112	7.519809	14.03818	4.497464
Probability	0.590792	0.000000	0.023286	0.000895	0.105533
Sum	142.8380	654.6940	90.07100	140.5350	150.5290
Sum Sq. Dev.	586.0675	8562.484	1.913681	11.58265	8.057443
Observations	35	35	35	35	35

Source: Author's computation using EViews 9 (2026).

Table 1 shows that GDP averaged 4.08% with a minimum of −6.37% (the 2020 contraction) and is approximately symmetric and normally distributed (Jarque-Bera probability of 0.59). INF averaged 18.71% but with a median of only 13.01%, reflecting a strongly positively skewed distribution driven by the mid-1990s inflation spikes, and rejects normality (probability 0.000). POP averaged 2.57%, is relatively tightly clustered (standard deviation of 0.24), and is negatively skewed, consistent with its post-2011 decline; normality is rejected at the 5% level (probability 0.023). UNEMP averaged 4.02%, ranging from 3.05% to 5.71%, and is positively skewed, reflecting the 2015–2020 surge, with normality rejected (probability 0.001). URB averaged 4.30% and is moderately negatively skewed but does not significantly depart from normality (probability 0.106). The departures from normality in INF, POP and UNEMP reflect episodic shocks rather than data error and do not preclude the use of ARDL, which does not require normality of the regressors.

4.3 Unit Root Test

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test

AT LEVEL		UNEMP	POP	GDP	INF	URB
With constant	t-stat. prob.	-3.234974 0.0267	-0.768993 0.8147	-3.794541 0.0068	-2.694731 0.0856	0.895492 0.9942
With constant and trend	t-stat. prob.	-3.518478 0.0538	-2.018941 0.5699	-3.681951 0.0375	-2.915631 0.1708	-1.932750 0.6150
Without constant and trend	t-stat. prob.	-0.309676 0.5661	-0.952971 0.2968	-1.387428 0.1505	-1.035904 0.2645	-1.602100 0.1017
AT FIRST DIFFERENCE						

AT LEVEL		UNEMP	POP	GDP	INF	URB
With constant	t-stat. prob.	-4.01452 0.0040	-2.067551 0.2583	-9.094255 0.0000	-4.657169 0.0007	-2.827620 0.0653*
With constant and trend	t-stat. prob.	-4.062072 0.0164	-2.685328 0.2486	-8.905401 0.0000	-4.579523 0.0046	-3.387935 0.0703
Without constant and trend	t-stat. prob.	-4.082267 0.0002	-2.043739 0.0409	-9.258705 0.0000	-4.719467 0.0000	-2.197508 0.0289

Source: Author's computation using EViews 9 (2026).

The Augmented Dickey-Fuller test was applied to each series at level and first difference under three specifications (Table 2). GDP was stationary at level under two of the three specifications, and is therefore integrated of order zero, I(0). UNEMP, POP, INF and URB were non-stationary at level but became stationary after first differencing, and are therefore integrated of order one, I(1). Since the maximum order of integration is one and none of the variables is I(2), the pre-condition for the ARDL bounds testing approach is satisfied.

4.4 ARDL Model Estimation and Bounds Test

Table 3: ARDL(2, 1, 0, 0, 0) Model Estimation Results

Dependent Variable: UNEMP				
Method: ARDL				
Date: 08/29/26 Time: 06:34				
Sample (adjusted): 1992 2024				
Included observations: 33 after adjustments				
Maximum dependent lags: 2 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (2 lags, automatic): POP GDP INF URB				
Fixed regressors: C				
Number of models evalulated: 162				
Selected Model: ARDL(2, 1, 0, 0, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
UNEMP(-1)	1.100053	0.138442	7.945962	0.0000
UNEMP(-2)	-0.614322	0.197000	-3.118382	0.0045
POP	-1.945982	1.484077	-1.311241	0.2017
POP(-1)	1.887574	1.405538	1.342955	0.1914
GDP	-0.046045	0.013091	-3.517305	0.0017

Dependent Variable: UNEMP				
INF	-0.004275	0.003132	-1.365027	0.1844
URB	0.004576	0.233252	0.019617	0.9845
C	2.435271	1.425449	1.708424	0.0999
R-squared	0.898470	Mean dependent var		4.036485
Adjusted R-squared	0.870042	S.D. dependent var		0.593410
S.E. of regression	0.213922	Akaike info criterion		-0.039191
Sum squared resid	1.144068	Schwarz criterion		0.323598
Log likelihood	8.646656	Hannan-Quinn criter.		0.082876
F-statistic	31.60483	Durbin-Watson stat		1.794569
Prob(F-statistic)	0.000000			
*Note: p-values and any subsequent tests do not account for model selection.				

Source: Author's computation using EViews 9 (2026).

EViews 9 selected ARDL(2, 1, 0, 0, 0) as the optimal model via the Akaike Information Criterion, searching 162 candidate specifications (Table 3). The model fits the data well, with an adjusted R-squared of 0.870, indicating that about 87% of the variation in unemployment is jointly explained by the regressors and the lagged dependent variable. The overall F-statistic (31.60, probability 0.000) confirms joint significance, and the Durbin-Watson statistic (1.79) suggests the model is reasonably free of first-order autocorrelation. UNEMP(-1), UNEMP(-2) and GDP are individually significant at 5%, while POP, POP(-1), INF and URB are not significant in this short-run dynamic equation.

Table 4: ARDL Bounds Test Result

Test Statistic	Value	K
F-statistic	3.231677	4

Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
1%	3.29	4.37

Source: Author's computation using EViews 9 (2026).

The ARDL bounds test (Table 4) produced an F-statistic of 3.232, which exceeds the upper bound I(1) critical value of 3.09 at the 10% level, providing evidence of a long-run relationship at that level, though the test is inconclusive at the conventional 5% level (where the statistic falls between the lower and upper bounds). Because a negative and significant error correction term is itself independent evidence of a stable long-run relationship (Banerjee, Dolado, & Mestre, 1998), and given the result reported in Section 4.5 below, the study proceeds on the understanding that a long-run relationship among unemployment, population growth and the control variables is present, albeit with moderate rather than overwhelming statistical strength.

4.5 Long-Run and Short-Run Estimates

Table 5: Cointegrating Form (Short-Run Coefficients)

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNEMP(-1))	0.618462	0.108192	5.716351	0.0000
D(POP)	-1.866808	1.560617	-1.196198	0.2428
D(GDP)	-0.051686	0.009815	-5.266007	0.0000
D(INF)	-0.003479	0.003227	-1.078314	0.2912
D(URB)	0.103139	1.098230	0.093913	0.9259
CointEq(-1)	-0.468238	0.093985	-4.982059	0.0000
Cointeq = UNEMP - (-0.1136*POP -0.0895*GDP -0.0083*INF + 0.0089 *URB + 4.7354)				

Source: Author's computation using EViews 9 (2026).

The error correction term, CointEq(-1), is −0.468 and highly significant (probability 0.000; Table 5), confirming that the model is dynamically stable: about 46.8% of any disequilibrium between unemployment and its long-run determinants is corrected within one year, implying full convergence in a little over two years.

Table 6: Long-Run Coefficients

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

Cointegrating Form				
D(UNEMP(-1))	0.618462	0.108192	5.716351	0.0000
D(POP)	-1.866808	1.560617	-1.196198	0.2428
D(GDP)	-0.051686	0.009815	-5.266007	0.0000
D(INF)	-0.003479	0.003227	-1.078314	0.2912
D(URB)	0.103139	1.098230	0.093913	0.9259
CointEq(-1)	-0.468238	0.093985	-4.982059	0.0000
Cointeq = UNEMP - (-0.1136*POP -0.0895*GDP -0.0083*INF + 0.0089 *URB + 4.7354)				

Source: Author's computation using EViews 9 (2026).

The long-run coefficients (Table 6) show that population growth (POP) has a negative but statistically insignificant coefficient of −0.114 (probability 0.910), contrary to the a priori Malthusian expectation. Real GDP growth (GDP) has a negative and statistically significant coefficient of −0.090 (probability 0.015): a 1 percentage-point increase in GDP growth is associated with unemployment about 0.09 percentage points lower in the long run, consistent with Keynesian theory and Okun's Law, and is the single most robust individual determinant in the model. Inflation (−0.008, probability 0.175) and urbanization (0.009, probability 0.985) carry theoretically plausible signs but are not statistically significant.

4.6 Diagnostic and Stability Tests

Table 7: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.393585	Prob. F(2,23)	0.6791
Obs*R-squared	1.092043	Prob. Chi-Square(2)	0.5792

Source: Author's computation using EViews 9 (2026).

The Breusch-Godfrey LM test (Table 7) shows no evidence of serial correlation up to lag 2 (probabilities of 0.679 and 0.579, both above 0.05).

Table 8: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.527933	Prob. F(7,25)	0.0412
Obs*R-squared	13.67713	Prob. Chi-Square(7)	0.0572
Scaled explained SS	20.32464	Prob. Chi-Square(7)	0.0049

Source: Author's computation using EViews 9 (2026).

The Breusch-Pagan-Godfrey test (Table 8) rejects the null of homoskedasticity on the majority of its statistics (F-statistic probability 0.041; scaled explained SS probability 0.005), indicating heteroskedasticity plausibly linked to the sharp swings in unemployment, inflation and GDP growth documented in Section 4.1. Since heteroskedasticity affects the efficiency rather than the consistency of the coefficient estimates, the signs and significance reported in Table 6 remain informative, though associated probability values should be interpreted with some caution.

Table 9: Variance Inflation Factors

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
UNEMP(-1)	0.019166	232.1695	4.317477
UNEMP(-2)	0.038809	472.4913	8.178983
POP	2.202484	10560.63	91.01838
POP(-1)	1.975538	9586.242	71.33283
GDP	0.000171	3.857921	1.919272
INF	9.81E-06	4.411441	1.798519
URB	0.054407	722.3963	8.695685
C	2.031904	1465.228	NA

Source: Author's computation using EViews 9 (2026).

Variance Inflation Factors (Table 9) range from 1.92 (GDP) to 91.02 (POP), with POP and its lag exceeding the conventional threshold of 10. This elevated collinearity is largely mechanical, since POP and POP(-1) are, by construction, the same series one year apart, and does not invalidate the long-run and cointegrating results, though the short-run coefficients on POP and POP(-1) should be interpreted jointly rather than in isolation.

The Jarque-Bera test rejected normality of the residuals (statistic 18.96, probability 0.000), reflecting a small number of large negative residuals most likely associated with the 2020 recession. The CUSUM test remained within the 5% critical bounds throughout the sample, indicating broadly stable parameters, while the CUSUMSQ test rose sharply after 2020 and approached, without clearly breaching, the upper bound, consistent with the heteroskedasticity finding above and suggesting a shift in residual variance concentrated in the most recent years of the sample.

4.7 Granger Causality Test and Hypothesis Testing

Table 10: Pairwise Granger Causality Test Results (Lags: 2)

Null Hypothesis:	Obs	F-Statistic	Prob.
INF does not Granger Cause GDP	33	0.05652	0.9452
GDP does not Granger Cause INF		0.85640	0.4355
POP does not Granger Cause GDP	33	4.25474	0.0244
GDP does not Granger Cause POP		0.16736	0.8467
UNEMP does not Granger Cause GDP	33	0.17175	0.8431
GDP does not Granger Cause UNEMP		0.00660	0.9934
URB does not Granger Cause GDP	33	3.15773	0.0580
GDP does not Granger Cause URB		0.16892	0.8454
POP does not Granger Cause INF	33	0.24925	0.7811
INF does not Granger Cause POP		0.13866	0.8711
UNEMP does not Granger Cause INF	33	0.13254	0.8764
INF does not Granger Cause UNEMP		0.03429	0.9663
URB does not Granger Cause INF	33	0.50743	0.6075
INF does not Granger Cause URB		0.27436	0.7621
UNEMP does not Granger Cause POP	33	0.07941	0.9239
POP does not Granger Cause UNEMP		5.34234	0.0108

URB does not Granger Cause POP	33	4.64913	0.0181
POP does not Granger Cause URB		8.47461	0.0013
URB does not Granger Cause UNEMP	33	3.15243	0.0582
UNEMP does not Granger Cause URB		2.97708	0.0673

Source: Author's computation using EViews 9 (2026).

The Pairwise Granger Causality Test (Table 10), conducted at 2 lags, shows that population growth Granger-causes unemployment (F-statistic 5.342, probability 0.011), while unemployment does not Granger-cause population growth (F-statistic 0.079, probability 0.924), indicating unidirectional causality running from population growth to unemployment in Nigeria over 1990–2024. No significant causal relationship, in either direction, was found between GDP growth and unemployment, indicating that the bivariate Granger test, considering only two series in isolation, can miss a relationship that GDP growth nonetheless shows as a significant determinant within the fuller multivariate ARDL model. Population growth also Granger-causes GDP growth (probability 0.024) and shares a bidirectional relationship with urbanization (probabilities of 0.018 and 0.001).

With respect to H01, the long-run ARDL coefficient on population growth is statistically insignificant, so the null of no significant relationship cannot be rejected on the strength of that coefficient alone; however, the bounds test and the significant error correction term indicate that unemployment, population growth and the control variables are bound together in a stable long-run system. The evidence on H01 is therefore mixed. With respect to H02, the Granger causality result is unambiguous: the null hypothesis of no significant causal relationship is rejected, establishing a significant, unidirectional causal relationship running from population growth to unemployment.

Taken together, these results suggest that population growth does not exert an immediate, proportional effect on Nigeria's unemployment rate once GDP growth, inflation and urbanization are controlled for, contrary to the simplest form of the Malthusian prediction. It is, however, a genuine causal driver of unemployment, operating through lagged, dynamic channels, a combination consistent with Olabiyi et al. (2024), who similarly reported a conditional rather than strictly proportional effect, but distinguishable from Ammani et al. (2024) and Dauda (2024), who found a directly significant long-run coefficient. Real GDP growth, by contrast, is confirmed as the single most robust determinant of unemployment in the sample, in line with Aderemi et al. (2022) and Oniore et al. (2023), who similarly documented that Nigeria's growth has not always been sufficiently labour-absorbing.

5. Conclusion and Recommendations

This study examined the trend, long-run and short-run relationship, and direction of causality between population growth and unemployment in Nigeria from 1990 to 2024, using the ARDL bounds testing approach and the Pairwise Granger Causality Test. Population growth followed a smooth, hump-shaped trajectory, peaking around 2011 before declining, while unemployment rose sharply only after 2015, a

divergence in timing that motivated the causality investigation. The ARDL bounds test indicated a long-run relationship among the variables at the 10% level, reinforced by a negative and highly significant error correction term (−0.468), but the long-run coefficient on population growth itself was negative and statistically insignificant, contrary to the Malthusian expectation, while real GDP growth exerted a negative and significant long-run effect and stood as the most robust determinant in the model. The Granger causality test, however, established a statistically significant, unidirectional causal relationship running from population growth to unemployment.

It is concluded that population growth does not exert a statistically significant, immediate, proportional effect on unemployment in Nigeria once GDP growth, inflation and urbanization are controlled for; the classical Malthusian prediction is therefore not supported in its simplest form. Population growth is nonetheless established as a genuine, statistically significant causal driver of unemployment, operating through lagged and indirect channels that a simple contemporaneous elasticity does not fully capture. Nigeria's unemployment challenge is best understood not as a direct, mechanical consequence of population growth, but as the outcome of an economy whose job-creating output growth has, for much of the period, struggled to keep pace with both its labour force and its rapidly growing population, with population growth acting as a slow-burning causal pressure rather than an immediate proximate cause.

Based on these findings, the study recommends, first, that government at the federal and state levels prioritise employment-intensive economic growth, given that real GDP growth was the single most robust determinant of lower unemployment, with particular attention to labour-intensive sectors such as agriculture, agro-processing, construction and small and medium-scale manufacturing. Second, given the significant, if lagged, causal influence of population growth on unemployment, policymakers should treat population and labour-market planning as complementary policy domains, with deliberate investment in education and vocational skills training targeted at the expanding youth population, so that population growth becomes a productive demographic dividend rather than a source of rising joblessness. Third, the National Bureau of Statistics and the National Population Commission should strengthen the collection and timely publication of disaggregated labour-force and demographic data to enable more granular future research. Future studies could usefully disaggregate the analysis by age cohort, gender and geopolitical zone using panel data, apply robust or threshold ARDL techniques in view of the heteroskedasticity and non-normality identified here, or extend the analysis across a panel of Sub-Saharan African countries to establish whether the pattern found for Nigeria, a weak direct long-run relationship alongside a significant causal link, is a general regional pattern.

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