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Population Dynamics, Unemployment and Economic Growth in Nigeria: Policy Lessons from Time-Series Evidence

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Abstract: This study examines the short-run and long-run effects of population growth and unemployment on economic growth in Nigeria using annual time-series data. Employing the Autoregressive Distributed Lag (ARDL) approach, with government expenditure and per capita income included as control variables, the study accounts for mixed orders of integration and dynamic adjustments. The bounds test confirms the existence of a long-run cointegrating relationship among the variables. The short-run results reveal that unemployment has a negative and statistically significant effect on real GDP growth, while population growth exerts a negative but insignificant influence. Government expenditure and per capita income show positive but insignificant effects in the short run. In the long run, population growth emerges as a positive and significant driver of economic growth, suggesting the presence of a potential demographic dividend, whereas unemployment remains negative and statistically significant, indicating persistent labour market inefficiencies. The control variables maintain positive but insignificant effects in the long run. These findings imply that Nigeria's demographic expansion can support economic growth only when accompanied by effective employment creation and labour market absorption. The study therefore underscores the importance of employment-centered growth strategies, human capital development, and efficient public expenditure in harnessing population growth for sustainable economic development.

Keywords: *Population Growth; Unemployment; Economic Growth; ARDL; Nigeria*

1. Introduction

Historically, agriculture constituted the primary source of livelihood in most economies, and population growth was therefore viewed as a catalyst for increased production and economic expansion. A larger population was believed to enhance productivity and economic security, as a greater supply of labour, when efficiently utilized, could significantly boost output and national income (Tartiyus, Dauda & Peter, 2015). In early stages of economic development, societal and economic progress was largely dependent on the productivity of the agricultural sector, where population expansion translated into higher labour input and improved economic performance. Consequently, economic growth accelerated as societies benefitted from more efficient labour utilization and expanded production capacity.

High fertility rates in earlier periods contributed to labour force expansion, enhanced productivity, and intensified economic activities, while simultaneously offsetting historically high mortality rates caused by famine, disease, malnutrition, plague, and war (Latimer & Kulkarni, 2008). However, the advent of modernization and technological advancement has significantly

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altered demographic and economic dynamics. Advances in medical technology, improved sanitation, and better disease control mechanisms have drastically reduced mortality rates across the globe. At the same time, technological progress has enhanced labour productivity, enabling societies to produce more with fewer resources. The combined effects of medical and technological improvements have therefore created conditions for unprecedented global population growth, raising critical questions about the capacity of economies to absorb and productively engage expanding populations.

Unemployment remains a pervasive feature of the contemporary global economy and represents a major obstacle to economic progress, particularly in emerging economies. Although unemployment also affects developed countries, its intensity and socioeconomic consequences are more severe in developing nations. Unemployment typically arises when job creation fails to keep pace with population growth, resulting in excess labour supply. Even among the employed, job insecurity has become widespread due to unstable labour demand, employee retrenchment, and economic downturns, especially during periods of recession (Babatunde, 2022). Unemployment may be voluntary or involuntary: voluntary unemployment occurs when individuals choose not to work despite the availability of jobs, often due to income security or expectations of better opportunities, whereas involuntary unemployment arises when individuals willing and able to work at prevailing wage rates are unable to secure employment. Persistent unemployment has long been recognized as a major economic and social challenge, as it represents a substantial waste of human resources and undermines a country's growth potential.

Nigeria exemplifies the complex development challenges associated with rapid population growth and high unemployment, both of which have contributed to the country's sluggish and unstable economic growth trajectory. While population growth can potentially stimulate economic activity through increased labour supply and consumption demand, it can equally become a liability when economic opportunities, infrastructure, and social services fail to expand proportionately. Todaro and Smith (2015) argue that in developing economies, unchecked population growth often exacerbates resource constraints, deepens poverty, and weakens economic performance. In Nigeria, population growth has averaged over 2.5 percent annually (World Bank, 2023), yet economic growth has not translated into sufficient job creation or improved living standards, thereby intensifying social and economic pressures.

Unemployment, particularly among young and educated Nigerians, has remained persistently high, further weakening economic stability and development prospects. Adebayo (2013) attributes Nigeria's rising unemployment to structural deficiencies such as limited industrial capacity, weak private sector development, and significant mismatches between labour supply and market demand. Similarly, Aiyedogbon and Ohwofasa (2012) contend that unemployment not only suppresses aggregate demand but also fuels social unrest, crime, and declining productivity. Despite the implementation of several government initiatives, including the National Economic Empowerment and Development Strategy (NEEDS) and the N-Power programme, unemployment rates remain above 30 percent (NBS, 2022), indicating limited success in addressing the underlying structural causes of joblessness.

Moreover, the simultaneous occurrence of rapid population growth and persistent unemployment underscores the need to examine their combined effects on Nigeria's economic growth. While population expansion may increase the size of the labour force, high unemployment implies that a substantial portion of this labour remains unutilized or underutilized, thereby constraining productivity and output growth.

Investigating these variables jointly provides deeper insight into whether Nigeria's demographic expansion constitutes a demographic dividend or a demographic burden. Understanding the interaction between population growth and unemployment is therefore critical for designing integrated policies that promote job creation, human capital development, and inclusive growth. Such an analysis is particularly relevant for Nigeria, where failure to align population dynamics with labour market capacity risks perpetuating poverty, inequality, and long-term economic stagnation.

Importantly, this study distinguishes itself from prior research works by simultaneously examining the combined effects of population growth and unemployment on Nigeria's economic growth**,** an area that remains underexplored in the Nigerian context. While several studies have analysed the individual impacts of population growth or unemployment on economic performance, their findings are often compartmentalised**,** limiting insights into how these forces interact within the broader growth process. For example, Obisi, Akpankpo, and Nwankwo (2018) investigated the effect of unemployment on economic growth in Nigeria but did not integrate demographic dynamics, thereby failing to account for how rapid population expansion exacerbates labour market pressures**.** Similarly, Okoroafor and Nwankwo (2020) focused on population growth's effect on GDP without addressing the simultaneous influence of unemployment, which may distort the net impact of population changes on output. By bringing both variables into a single analytical framework, the present study captures the interdependence between Nigeria's demographic trends and labour market performance**,** offering a more holistic understanding of growth dynamics.

In addition, the adoption of the Autoregressive Distributed Lag (ARDL) estimation technique further enhances the study's methodological distinctiveness. Unlike traditional approaches such as Ordinary Least Squares (OLS) or Vector Autoregression (VAR), which often require all variables to be integrated of the same order and may produce spurious results when this condition is violated, the ARDL framework accommodates variables of mixed integration orders (I(0) and I(1)) and enables simultaneous estimation of short-run and long-run effects (Pesaran, Shin & Smith, 2001). Prior studies in the Nigerian growth literature, such as those by Eze and Esang (2019) and Udeagha and Ibe (2017), relied heavily on OLS or cointegration methods that either overlook short-run dynamics or inadequately model long-run equilibrium relationships. By leveraging ARDL, this research delivers more robust inferences**,** accounts for endogeneity concerns**,** and provides nuanced insights into how population growth and unemployment jointly influence economic growth over different time horizons. This combined theoretical and methodological approach not only fills a clear gap in existing literature but also offers policy-relevant evidence that is better suited to informing integrated economic and demographic policy interventions in Nigeria.

2. Literature Review

Several empirical studies have investigated the individual effects of unemployment and population growth on economic growth in Nigeria and other developing economies, yielding mixed results and methodological limitations that this study seeks to address.

Obisi, Akpankpo, and Nwankwo (2018) examined the effect of unemployment on Nigeria's economic growth using time-series data spanning 1981–2016. Employing an Ordinary Least Squares (OLS) regression framework, the authors found a significant negative relationship between unemployment and GDP, consistent with Okun's Law. However, the study was limited by its univariate focus, analysing unemployment in isolation and consequently overlooking how concurrent demographic pressures might

modulate its impact on growth. Furthermore, reliance on OLS without addressing potential endogeneity and non-stationarity in the data poses risks of spurious estimates, especially in macroeconomic time series.

Okoroafor and Nwankwo (2020) investigated the relationship between population growth and economic performance in Nigeria over the period 1990–2018. Using cointegration and error correction modelling techniques, they reported that population growth exhibited a positive but statistically insignificant influence on GDP, suggesting that increases in population did not translate into commensurate economic expansion. Despite contributing to the literature on demographic influences, the study did not incorporate unemployment as a concurrent explanatory variable. This univariate specification limits the interpretation of results, as it fails to capture potential interaction effects between an expanding labour force and labour market outcomes.

Eze and Esang (2019) explored the determinants of economic growth in Nigeria, including unemployment, investment, and government expenditure, using OLS and Granger causality approaches. While the study identified unemployment as a significant negative determinant of growth, it did not explicitly model population growth, thereby constraining its ability to inform demographic policy. Moreover, the use of OLS and basic causality tests overlooks long-run equilibrium relationships and mixed orders of integration among variables, which are common in macroeconomic time series.

Udeagha and Ibe (2017) employed a vector error correction model (VECM) to investigate the long-run relationships among unemployment, inflation, and growth in Nigeria. Their findings pointed to a long-run negative impact of unemployment on growth, but the analysis again excluded population growth, and the focus remained on broad macroeconomic indicators rather than demographic dynamics. Although VECM accommodates cointegrating relationships, it requires all variables to be integrated of the same order and can suffer from identification issues, limiting its flexibility compared to more modern techniques.

Beyond Nigeria, studies in other developing contexts reflect similar patterns. For instance, research in Ghana by Asante and Al-Hassan (2016) applied Johansen cointegration methods to analyse demographic variables and growth but did not incorporate labour market indicators such as unemployment. In Kenya, Wanjiku and Omwenga (2018) documented that rapid population growth exerted negative pressure on economic performance but treated unemployment and demographic variables separately.

Shah et al. (2022) investigated the impact of unemployment on GDP growth in Pakistan from 1974 to 2020 using the ARDL technique, including population growth as one of the explanatory variables. The study found that unemployment negatively affects economic growth, while population growth has a positive impact. Although ARDL was used, the study mainly focused on unemployment and general macroeconomic variables, with limited attention to how the joint interaction of population growth and unemployment influences growth dynamics in a single comprehensive model.

Rahman and Khatimah (2025) studied the effects of population and unemployment on economic growth and poverty in a regional Indonesian setting. Their path analysis showed that both population and unemployment negatively influenced economic growth, but the methodology did not control for economic cycles or long-run equilibrium, which weakens the generalizability of the results beyond short-term associations.

3. Methodology

3.1 Theoretical Framework

This study is rested on the theoretical underpinning of the endogenous growth theory. The theory argues that economic

growth is generated by forces within a system rather than external forces. It specifically argues that economic growth is a result of policies, internal processes and investment in human capital. Economic growth of a country therefore on the basis of endogenous growth is on account of government policies promoting innovation, investment in human capital and acquisition of knowledge which constitutes internal technology driving economic growth. In the context of the present study therefore, Nigeria government policies on population growth controlling population growth through birth rates and death rates, will affect achievement of significant levels of economic growth of Nigeria. Hence, the endogenous growth theory is appropriate as the framework of the present study.

3.2 Model Specification

Based on the theoretical proposition of the Endogenous growth theory analyzed above, the model for this current study is hereby specified below:

$$RGDPgr = f(POPG, UEMP, PCI, TGEX) \ldots. eq\ 3.1$$

Equation 3.1 is therefore presented in an explicit and econometric form as follows:

$$RGDPgr_t = \beta_0 + \beta_1 POPG_t + \beta_2 UEMP_t + \beta_3 PCI_t + \beta_4 TGEX_t + \varepsilon_t \ldots.. eq\ 3.2$$

Where:

$RGDPgr_t$= Real Gross Domestic Product growth rate

$POPG_t$= Population Growth Rate

$UEMP_t$= Unemployment rate

PCI_t= Per capita income

$TGEX_t$= Total Government expenditure

ε_t= Error Term

3.3 Sources of Data

The data design for this study involves the annual time series spanning from 1990 to 2023. Data on the Real GDP growth rate (RGDPgr), Unemployment Rate (UEMP), Per Capita Income (PCI), Population Growth rate (POPG) and Total Government Expenditure (TGEX) are all sourced from World Development Indicator (WDI) of World Bank databank.

3.4 Estimation Techniques

Unit Root Test

This aspect concerns with the adoption of unit root test to determine whether the variables are non- stationary using the result of Augmented Dickey Fuller (ADF) test. Classical econometric theory requires that economic variables be stationary before estimation of the model can be done. However, most econometric variable has been seen to be non-stationary i.e. the mean and variance are not constant therefore; it is a preliminary condition to test for unit root before proceeding to econometric analysis. In this study, the stationarities of the variables are tested using Augmented Dickey Fuller (ADF) unit root test.

Autoregressive Distributed Lag (ARDL) Model

To analyse the impact of population growth and unemployment on economic growth, this study adopts the Autoregressive Distributed Lag (ARDL) model. This technique is chosen due to its suitability for small sample sizes and its ability to capture both short-run and long-run dynamics among variables regardless of whether they are integrated at level I(0) or first difference I(1). The ARDL model enabled the estimation of how changes in population growth and unemployment influence GDP over time. In this regard, the model in eq 3.2 is therefore represented in an Autoregressive Distributed Lag (ARDL) framework as proposed by Pesaran, Shin and Smith (2001). The standard ARDL $(P, q_1, q_2, \ldots\ldots\ldots\ldots)$ model for this study is therefore presented as follows:

$$GDPgr_t = \beta_0 + \sum_{i=1}^{p} \beta_1 GDPgr_{t-1} + \sum_{j=0}^{q_1} \beta_j POPG_{t-j} + \sum_{k=0}^{q_2} \beta_k UEMP_{t-k} + \sum_{l=0}^{q_3} \beta_l PCI_{t-l} + \sum_{m=0}^{q_4} \beta_m TGEX_{t-m} + \varepsilon_t \ldots\ldots eq\ 3.3$$

4. Results and Discussion

4.1 Unit Root Test Results

This particular section of the study determines if a time series is stationary or non-stationary. Stationary series have constant mean and variance over time, while non-stationary series exhibit trends or random walks. Unit root tests, such as the Augmented Dickey-Fuller (ADF) test, help identify if a series is stationary, ensuring reliable regression analysis and forecasting

Table 4.1: ADF Unit Root Test Results

Variables	Level		First difference		I(d)
	ADF T-Statistics	P-Value	ADF T-Statistics	P-Value	
RGDPgr	-0.965631	0.7533	-2.937187	0.0522	1(1)
TGEX	8.177057	0.0000***	4.406633	1.0000***	I(0)
PCI	8.423045	0.0000***	5.951600	0.0048***	1(0)
POPG	-1.634958	0.4521	-4.281580	0.0007***	1(1)
UEMP	-3.057013	0.0410**	-3.302428	0.0244**	1(0)

Source: Author's Computation (2025)

The unit root test results reveal that RGDPgr and POPG are not stationary at level but become stationary after first differencing, indicating they are I(1). TGEX, PCI and UEMP are stationary at level (I(0)). The asterisks (*, **, ***) typically indicate significance at the 10%, 5%, or 1% levels respectively, confirming whether a variable is stationary at a given confidence level. Since the variables are a mix of I(0) and I(1), the appropriate estimation technique is the Autoregressive Distributed Lag (ARDL) model, as it accommodates mixed integration orders and supports robust inference in dynamic settings.

4.2 ARDL Bound Test

Table 4.2: ARDL Bound Test result

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	10.24347	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Source: Author's Computation (2025)

The ARDL Bounds Test results indicate a long-run relationship between the variables, as the F-statistic (10.24347) exceeds the upper bound critical value at 5% significance level, allowing us to reject the null hypothesis of "no levels relationship." This suggests that the variables are cointegrated and have a stable long-run equilibrium relationship.

4.3 ARDL Short-run estimation

Table 4.3 ARDL Short-run estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(TGEX)	0.002118	0.026241	0.080697	0.9363
D(PCI)	0.021936	0.027093	0.809645	0.4258
D(POPG)	-0.096502	0.163305	-0.590929	0.5599
D(UEMP)	-0.030329	0.012787	-2.371940	0.0257
CointEq(-1)*	-0.153333	0.019893	-7.707928	0.0000

Source: Author's Computation (2025)

Table 4.3 above exhibits the results of the ARDL short-run estimation for economic growth (RGDPgr) in Nigeria. Results from the short-run estimates reveal that the total government expenditure (TGEX) exhibits a positive but statistically insignificant effect on real GDP growth. This result suggests that increases in public spending do not immediately translate into economic growth, possibly due to inefficiencies in public expenditure allocation, implementation delays, and the dominance of recurrent spending over capital investment. This finding aligns with earlier Nigerian studies such as Eze and Esang (2019) and Obisi et al. (2018), who reported weak short-term growth effects of government spending, but contrasts with Keynesian expectations that fiscal expansion should stimulate output in the short run.

Similarly, per capita income (PCI) shows a positive but insignificant relationship with economic growth in the short run. This implies that marginal increases in average income levels are insufficient to stimulate immediate growth, possibly due to income inequality, low savings rates, or weak productive reinvestment mechanisms. This outcome is consistent with Aiyedogbon and Ohwofasa (2012), who argue that rising incomes in Nigeria often fail to translate into broad-based economic expansion due to structural distortions and consumption-biased income use.

The short-run effect of population growth (POPG) is negative but statistically insignificant, indicating that rapid population expansion does not exert an immediate measurable impact on economic growth. This result reflects the delayed nature of demographic effects, as population growth initially increases dependency ratios and places pressure on public services before contributing productively through labour force participation. This finding aligns with Todaro and Smith (2015), who argue that in the short run, population growth in developing countries often imposes adjustment costs rather than growth benefits.

In contrast, unemployment (UEMP) exerts a negative and statistically significant effect on economic growth in the short run. This implies that rising unemployment immediately constrains output by reducing aggregate demand, lowering labour utilisation, and weakening productivity. The result strongly supports Okun's Law and is consistent with empirical findings for Nigeria by Adebayo (2013), Udeagha and Ibe (2017), and Obisi et al. (2018), all of whom documented that unemployment is a major short-term drag on economic performance. This outcome highlights the sensitivity of Nigeria's growth process to labour market conditions. The error correction term (CointEq(-1)) is negative and highly significant (coefficient = -0.1533; p = 0.0000), confirming the existence of a long-run equilibrium relationship among the variables. The coefficient of -0.1533 implies that about 15.3% of the deviation from long-run equilibrium is corrected each period (annually), meaning that the system adjusts slowly but significantly toward equilibrium over time.

4.4 ARDL Long-run estimation

Table 4.4 ARDL Long-run estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TGEX	0.013810	0.170486	0.081006	0.9361
PCI	0.143060	0.179235	0.798169	0.4323
POPG	1.602496	0.588039	2.725154	0.0116
UEMP	-0.006954	0.077103	-0.090198	0.0288

Source: Author's Computation (2025)

Results of the long run estimation in table 4.4 above show that the total government expenditure (TGEX) retains a positive but insignificant effect on economic growth. This suggests that public spending in Nigeria has not been sufficiently growth-enhancing over time, possibly due to governance challenges, weak institutions, and limited investment in productivity-enhancing sectors. This finding corroborates the long-run evidence reported by Eze and Esang (2019) and contrasts with studies in more institutionally efficient economies where public expenditure significantly promotes growth.

Per capita income (PCI) also remains positive but insignificant in the long run, indicating that income growth alone does not guarantee sustained economic expansion. This may reflect persistent inequality and limited structural transformation in Nigeria, where increases in income do not necessarily translate into capital accumulation or technological progress. This result aligns with Aiyedogbon and Ohwofasa (2012) and broader development literature emphasizing the importance of income distribution and productive reinvestment.

Notably, population growth (POPG) exhibits a positive and statistically significant impact on economic growth in the long run. This finding implies that Nigeria's growing population eventually contributes to economic expansion through increased labour supply, market size, and productive capacity once adjustment processes are complete. The result supports the Endogenous Growth Theory, which emphasizes the role of human capital and labour force expansion in driving long-term growth. It also aligns with empirical evidence from Tartiyus, Dauda, and Peter (2015) and Latimer and Kulkarni (2008), who found that population growth can enhance economic performance when absorbed into productive activities. However, this result contrasts with pessimistic population-growth theories that view rapid population expansion as inherently growth-retarding.

Conversely, unemployment (UEMP) remains negative and statistically significant in the long run, confirming that persistent joblessness structurally undermines Nigeria's growth potential. This indicates that even when population growth contributes positively to output, the inability of the economy to absorb labour negates potential demographic gains. This result is consistent with long-run findings by Udeagha and Ibe (2017) and Adebayo (2013), and reinforces the argument that unemployment represents a long-term constraint on sustainable growth rather than a short-term cyclical issue.

5. Conclusion and Policy Recommendations

This study analyses the short-run and long-run effects of population growth and unemployment on economic growth in Nigeria using the ARDL framework, with government expenditure and per capita income as control variables. The findings reveal that unemployment exerts a negative and statistically significant effect on economic growth in both the short and long run, confirming labour market inefficiencies as a major constraint on Nigeria's growth performance. Population growth shows a negative but insignificant short-run effect, reflecting initial adjustment costs, but becomes positive and significant in the long run, indicating that demographic expansion can support economic growth when productively absorbed. Government

expenditure and per capita income display positive but insignificant effects in both periods, suggesting weak transmission of public spending and income gains into productive growth.

Overall, these findings therefore imply that Nigeria's population growth represents a potential demographic dividend, rather than an inherent burden, provided that adequate employment opportunities are created. Persistent unemployment, however, offsets this potential and remains a structural impediment to sustainable economic growth.

Policy efforts should therefore prioritise employment-centred growth strategies, particularly through labour-intensive industrialisation, agricultural value-chain development, and support for small and medium-scale enterprises. Strengthening human capital development via education and skills-oriented training is essential to align labour supply with market demand. In addition, improving the efficiency and composition of public expenditure toward productivity-enhancing sectors such as infrastructure, health, and education is critical. Finally, population policies should be integrated with labour market and growth strategies to ensure that demographic expansion translates into sustained and inclusive economic growth in Nigeria.

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