

POPULATION GROWTH AND ECONOMIC GROWTH NEXUS: EVIDENCE FROM NIGERIA

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Abstract: This study examined the relationship between population growth and economic growth in Nigeria. The study employed annual time series data obtained from the CBN Statistical Bulletin and World Bank Data base for the period 1983 to 2022. The specific objectives that the study achieved include analyzing the effect of population growth on Nigeria's economic performance and determining the causal relationship between population and economic growth in Nigeria. The study employed the ADF unit root test, ARDL Bounds test for cointegration, and the error correction mechanism. The result of the unit root test revealed that the variables were stationary at a mixed order of integration (levels and first difference), while the ARDL Bounds test revealed the presence of a long-run relationship. Findings of the study further revealed that the population growth rate exerted a positive and significant long-run effect on economic growth within the study period. The error correction mechanism indicated that 42.31 % of the short-run disequilibrium is corrected in the long-run. The result from the Granger causality test also showed that there is a unidirectional relationship running from population to economic growth during this study. The paper recommended that the Nigerian government should embark on sensitization programs to enlighten the Nigerian populace on the need to check the fertility rate and that policies that enhance family planning should be adopted to put the population growth in check in Nigeria.

Keywords: Population Growth, Economic Growth, Fertility rate

1. INTRODUCTION

1.1 Background to the Study

Population growth is a critical demographic factor influencing economic growth in both developing and developed nations. Population growth and the growth of the economy are issues that have drawn the attention of economists globally. Nigeria has one of the fastest-growing populations in the world, with an estimated population exceeding 200 million people and an annual growth rate of about 2.6% (World Bank, 2020). While population growth can contribute to economic development by expanding the labor force and increasing domestic consumption, it poses significant challenges for a developing country like Nigeria. High population growth often strains resources, infrastructure, and social services, potentially impeding sustainable economic growth. Nigeria's economic structure and growth rate have not kept pace with its population growth, resulting in declining per capita income. Nigeria's economic growth rate has hovered around 2%–3% in recent years, a rate insufficient to outpace population growth (NBS, 2020). Consequently, per capita income has stagnated, worsening poverty levels and

reducing the standard of living for many Nigerians (Oyedele, 2021). Rising poverty levels contribute to a vicious cycle, where families facing economic hardship are more likely to have larger families, worsening the problem of population growth and putting further strain on the country's resources. Economic theories offer mixed perspectives on the relationship between population growth and economic growth. The Malthusian theory suggests that unchecked population growth can outpace resource availability, leading to poverty and underdevelopment (Todaro & Smith, 2015). Conversely, the demographic transition theory proposes that as countries develop, high birth rates eventually decline, leading to more sustainable population levels. In Nigeria, however, the high fertility rate and growing population continue to stress the economy, complicating efforts to achieve steady growth and development (Olaniyan & Bankole, 2005).

1.2 Statement of the Problem

Nigeria's high population growth rate presents both opportunities and challenges for economic growth. Nigeria, with a population estimated to exceed 200 million and growing at an annual rate of approximately 2.6%, is currently one of the most populous countries in the world (World Bank, 2020). By 2050, it is projected that Nigeria's population will reach approximately 400 million, making it the third most populous nation globally, after China and India (United Nations, 2019). This rapid population growth has significant implications for economic growth, employment, resource distribution, and sustainable development in the country.

Theoretically, there is contention about the impact of population growth on economic performance. On the one hand, population growth can stimulate economic development by providing a large workforce, expanding the consumer base, and potentially enhancing productivity through economies of scale (Bloom, Canning, & Sevilla, 2003). However, in the case of Nigeria, these potential benefits may not be realized due to structural challenges like insufficient infrastructure, high unemployment rates, and limited access to quality education and health care. When a rapidly growing population is not matched by commensurate economic opportunities and improvements in social services, it can exacerbate poverty, income inequality, and resource depletion, ultimately stifling economic growth (Olaniyan, 2019).

One of the main concerns with Nigeria's population growth is the strain it places on its economic resources. As the population grows, so does the demand for essential services, including education, healthcare, and housing, all of which require substantial public investment. Given Nigeria's limited fiscal capacity, this has resulted in a substantial financing gap, leaving large segments of the population with limited access to these services (National Bureau of Statistics [NBS], 2020). The inadequate provision of education and health care affects human capital development, which is crucial for economic productivity and growth (Akinyemi, 2021). In 2020, for example, over 10 million Nigerian children were out of school, suggesting a potential future workforce with insufficient skills to contribute effectively to the economy (UNICEF, 2020).

Additionally, high population growth has compounded Nigeria's unemployment and underemployment challenges. According to the National Bureau of Statistics (2020), Nigeria's unemployment rate stood at 33.3% in the fourth quarter of 2020, with youth unemployment rates even higher. The rapid population increase without proportional job creation has led to high rates of youth unemployment, resulting in lost economic potential and increasing social unrest (Afolabi, 2021). Unemployment among the youth, who make up a significant portion of Nigeria's population, indicates a misalignment between labor market demands and workforce skills, further hampering economic growth (Aigbokhan, 2022).

The pressure on Nigeria's natural resources due to rapid population growth also presents a significant obstacle to economic growth. As the population density rises, so does the demand for land, water, and energy. This often leads to unsustainable agricultural practices, deforestation, and environmental degradation, which negatively affect agricultural productivity—a critical sector in Nigeria's economy, employing over 35% of the labor force (World Bank, 2020). Environmental degradation resulting from resource overuse compromises the country's agricultural output and threatens food security, creating further challenges for economic development (Ogunbiyi, 2018).

Given these challenges, it is crucial to understand the relationship between population growth and economic growth in Nigeria.

1.3 Objectives of the Study

The broad objective of this study is to examine the population growth and economic growth of Nigeria using annual data covering the period from 1983 to 2022. The specific objectives are as follows:

- To analyze the effect of population growth on Nigeria's economic performance
- To examine the causal relationship between population and economic growth in Nigeria.

1.4 Research Questions

Attempts were made to provide answers to a series of questions including;

- What is the effect of population growth on Nigeria's economic growth?
- Is there any causal relationship between population growth and economic growth in Nigeria?

1.5 Research Hypothesis

The study was guided by the following null hypothesis;

H₀₁: There is no significant effect of population growth on Nigeria's economic growth.

H₀₂: There is no significant causal relationship between population growth and economic growth in Nigeria.

1.6 Significance of the Study

This study has significant implications for policymakers, development agencies, and scholars. This study contributes to the existing literature on population growth and economic growth by providing empirical insights specific to Nigeria, a country whose demographic challenges and economic potentials are particularly pressing. By examining the relationship between population growth and economic outcomes, this study is essential for informed policies aimed at optimizing the benefits of a large population while addressing the associated challenges.

For policymakers, the findings of this study will provide guidance on addressing issues related to overpopulation, such as unemployment, poverty, and social service demand. Additionally, the study's recommendations can help shape policies that promote sustainable economic growth, including investments in education, healthcare, and infrastructure. For development agencies, the research will highlight areas where interventions are most needed to alleviate poverty and improve the quality of life for Nigerians and other developing nations.

1.7 Scope of the Study

The scope of this study is limited to examining the relationship between population growth and economic growth in Nigeria between 1983 and 2022. The 40-year period was selected because it captures key demographic and economic trends, including rapid urbanization, high fertility rates, and significant policy reforms aimed at economic growth and development. The study focused on assessing how population growth influences economic indicators such as GDP growth, employment rates, and poverty levels.

1.8 Organization of the Study

This study is conducted up of five sections. Section 1 contains the study's general introduction. A review of the related literature is covered in Section 2, while the research methodology is covered in Section 3. The discussion and interpretation of the results are covered in Section 4. The summary of the findings, conclusions, and recommendations are covered in Section 5.

2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Concept of Population and Population Growth

Population refers to the total number of people living within a defined geographic area at a given time, while population growth is the increase in the number of individuals in a given area over time. It is influenced by factors such as birth rates, death rates, and migration. Rapid population growth can create a large labor force, which, if productively employed, can stimulate economic growth. However, uncontrolled population growth can strain resources, which leads to unemployment and impedes socio-economic development (Todaro & Smith, 2020).

In the Nigerian context, population growth has been characterized by high fertility rates and declining mortality rates due to improved health care. This has resulted in a youthful population structure, with over 60% of Nigerians below the age of 25 (UNDP, 2023). While this demographic trend offers the potential for a demographic dividend, it poses significant challenges in terms of education, employment, and social services.

2.1.2 Concept of Economic Growth

Economic growth refers to the sustained increase in a country's productive capacity, reflected in rising GDP and improved living standards. It involves increased investment, technological advancements, and efficient resource utilization. Economic growth is essential for poverty reduction, infrastructural development, and improved social welfare. In Nigeria, economic growth has been inconsistent, with periods of robust expansion driven by oil revenues, followed by economic recessions due to oil price volatility and policy inefficiencies. The role of the population in shaping these growth patterns is a subject of ongoing research and debate.

2.1.3 Population Growth and Economic Growth

The interaction between population growth and economic growth is complex and context dependent. While some economists argue that population growth can drive economic development by providing a larger workforce and expanding markets, others contend that it can hinder growth by creating resource scarcity and increasing dependency burdens (Bloom & Williamson, 1998). In developing countries like Nigeria, high population growth has often been associated with challenges such as unemployment, poverty, and inadequate infrastructure. However, population growth can also be a catalyst for growth if accompanied by investments in education, healthcare, and technology.

Factors Mediating the Population-Growth Relationship

i. Human Capital:

The quality of human capital determines the extent to which population growth contributes to economic development. Investments in education and skill acquisition can enhance the productivity of the labor force, turning population growth into an economic asset (Ogunleye & Adewale, 2019).

ii. Infrastructure:

Adequate infrastructure is essential for managing the pressures of population growth. In Nigeria, insufficient infrastructure in areas such as transportation, energy, and housing has intensified the challenges of rapid population growth (Oladeji, 2020).

iii. Employment Opportunities:

Population growth increases the labor supply, but without corresponding job creation, it can lead to high unemployment and underemployment rates, as seen in Nigeria. Creating jobs for the growing population is crucial for sustainable economic growth (Ikeji and Afolabi, 2021).

iv. Resource Management:

Efficient use of natural and financial resources is critical in balancing population growth with economic development. Nigeria's reliance on oil revenues has limited the diversification needed to address the demands of a growing population.

2.2 Theoretical Review

2.2.1 Malthusian Theory

Thomas Malthus posited that population growth tends to outpace the growth of resources, leading to poverty and stagnation. According to Malthus, unless checked by moral restraint or catastrophic events, high population growth can overwhelm available resources, reducing per capita income (Malthus, 1798). This perspective is partially relevant to Nigeria, where high population growth has been linked to resource depletion and socioeconomic challenges.

2.2.2 Demographic Transition Theory:

This theory explains how population growth transitions over time as a country develops. This suggests that in the early stages of development, high birth and death rates keep population growth stable. As health and living standards improve, death rates decline, leading to rapid population growth. Eventually, birth rates also decline, stabilizing population growth (Notestein, 1945). Nigeria appears to be in the early stages of this transition, with high birth rates and declining mortality rates.

2.2.3 Endogenous Growth Theory:

Endogenous growth models, such as those proposed by Romer (1990), emphasize the role of human capital, innovation, and technological progress in driving economic growth. From this perspective, population growth can foster economic development if accompanied by investments in education, health, and skills development.

2.2.4 The Solow-Swan Model:

The Solow model highlights the significance of capital accumulation, labor, and technological progress. This suggests that while population growth increases the labor supply, it can dilute capital if not matched with adequate investment. In Nigeria, the challenge lies in ensuring that population growth aligns with capital and technological improvements to sustain economic growth.

2.3 Empirical Review

Several empirical studies have explored the relationship between population growth and economic growth in Nigeria. Adewole (2012) examined the effect of population on economic growth in Nigeria from 1981 to 2007 using the ordinary least squares method of analysis. The result shows that population growth exerts a positive and significant effect on economic growth measured as Per Capita Income (PCI) and Real Gross Domestic Product (RGDP) in Nigeria within the study period.

Ukpong, Ekpebu and Ofem (2013) discussed the issues of poverty and population growth in Nigeria. The Augmented Dickey-Fuller tests, as well as the Engle-Granger and Johansen's cointegration tests were used to test for cointegration and stationarity of the time series data on poverty rate, population growth, and gross domestic product (GDP) real growth rate in Nigeria, while the ordinary least squares (OLS) regression analysis was used. The results showed a positive relationship between the poverty rate and population growth, and a negative relationship between the GDP real growth rate and the poverty rate in Nigeria.

Okwori, Ajegi, Ochinyabo and Abu (2015) examined the Malthusian Population Theory in Nigeria from 1982 to 2012. The study applied a vector error correction model and the result showed that Population Growth has no significant impact on Economic Growth in Nigeria.

Aidi, Emecheta and Ngwudiobu (2016) conducted a study on Population Dynamics and Economic Growth in Nigeria, using time series data from 1970 to 2014. The data were analyzed using the ordinary least squares estimation technique. The results revealed, among others, that all the core variables (i.e. fertility, mortality, and net migration) of the study were inversely related to economic growth during the investigated period. The study further revealed that gross fixed capital formation (GFCF) and savings are strong drivers of economic growth in Nigeria.

Lawanson (2016) examined Rapid Population Growth and Economic Development in Nigeria using the ordinary least square technique. The study showed that a growing economy such as Nigeria needs a growing population, that is, an increased supply of workers and consumers, although the exact nature of this relationship is complicated: population showed a positive but insignificant effect on economic growth (at first difference) and a negative but significant effect on economic growth (at first difference lagged) in Nigeria.

Orumie (2016) examined the effect of the unemployment rate and population growth rate on the gross domestic product in Nigeria. The study applied the multiple regression model conducted on data obtained from the National Bureau of Statistics Bulletin and the Central Bank of Nigeria within the period 1970–2010. The result of the analysis indicated a systematic relationship between the gross domestic product and the population growth and unemployment rate. The result also revealed that unemployment and population growth contribute commensurable to the gross domestic product.

Olusogo, Oluwarotimi and Muazu (2018) explored the effect of population growth on the economic growth of Nigeria from 1981 to 2015. Data used were GDP and exchange rate, Population growth rate, fertility rate, and crude death rate. Ordinary least squares regression was used to analyze these data. The findings of the study revealed that population growth has a positive and significant effect on the economic growth of Nigeria, while fertility was negative and significant for economic growth in Nigeria. However, the exchange rate and crude death rate are insignificant for the economic growth of Nigeria.

Ogunleye and Adewale (2019) analyzed the role of human capital development in mediating the relationship between population growth and economic growth. Their findings indicate that investments in education and health significantly enhance the productivity of Nigeria's growing population.

Okonkwo, Kalu & Nwosu (2019), the study adopted the political economy methodology in their study on restructuring for economic diversification in Nigeria. It stated that the Nigerian political economy has unfortunately centralized its economic resources, making it impossible for the active economic participation of the ever-increasing populace. Findings of the study revealed that the devolution of economic resources is a sine qua non-for sustainable growth and development that can support the rising population growth.

Onyeoma (2020) studied the influence of the rising population on Poverty and Unemployment in Nigeria using the autoregressive distributed lag boundaries (ARDL) approach on annual data from 1980 to 2018. This study explores the dynamic relationship between population growth and selected macroeconomic variables of economic growth, poverty, and unemployment as well as the direction of causality between them. The study also found that population growth and its components exerted a negative impact on the overall economic conditions in Nigeria.

Ikeji et al. (2021) investigated the effects of population growth on unemployment and poverty in Nigeria. They concluded that while population growth expands the labor force, inadequate job creation intensifies poverty and inequality. The study recommends targeted policies to harness the demographic dividend.

Adeleke (2022) conducted a study that examined the impact of population growth on economic growth in Nigeria from 1980 to 2020. Using autoregressive distributed lag (ARDL) models, they found a negative relationship between high population growth and GDP per capita, attributing the result to unemployment and inadequate infrastructure.

The United Nations Development Programme (UNDP, 2023) reported that Nigeria's youthful population presents both an opportunity and a challenge. While the youth bulge offers a potential demographic dividend, it requires substantial investment in education, skill acquisition, and employment opportunities to translate into economic growth.

2.4 Summary of the Empirical Review

Empirical studies on population growth and economic growth have produced mixed results. The reviewed literature suggests that the effect of population growth on economic growth in Nigeria depend on several factors, including the quality of human capital, infrastructure development, and resource management. This research aims to contribute to the existing literature by analyzing the relationship between population growth and economic growth in Nigeria and to find the extent to which population growth has affected the economic growth of Nigeria in the period under consideration (1983-2022) as well as their causal relationship.

3. METHODOLOGY

3.1 Research Design

This study adopted an econometric research design to analyze the relationship between the dependent and independent variables. The analytical method was applied for determining the variation in the explained variable as a result of changes in the independent variables.

3.2 Nature and Sources of Data

The study utilized secondary data consisting of annual time series data from 1983 to 2022. The data were extracted from the publication of the Central Bank of Nigeria Statistical Bulletin (2022) and World development index (2022). The data required include the Gross Domestic Product Growth Rate (GDPGR), Population growth rate (POP), Food Production Index (FPI), Fertility rate (FER), Inflation (INF), Gross Fixed Capital Formation (GFCF), and Total Government Expenditure (LNTGE).

3.3 Model Specification

This section specifies the econometric model that was employed in the study. The model employed in this study was adapted from the work of Akinola (2021), with slight modification. This model is presented as

$$\text{GDPGR} = \beta_0 + \beta_1\text{POP}_t + \beta_2\text{FPI}_t + \beta_3\text{FER}_t + \beta_4\text{INF}_t + \beta_5\text{GFCF}_t + \beta_6\text{LNTGE}_t + \mu_t$$

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 are estimated parameters. Where the variables are as earlier explained

3.4 Techniques of Data Analysis

3.4.1 Unit Root Test

The Unit Root Test was used to examine the stationarity of the time series data, ensuring reliable results. The Augmented Dickey-Fuller (ADF) and Phillips Perron test was employed, which includes lagged terms to account for serial correlation.

3.4.2 ARDL Bound Test

ARDL bound test was used to determine the long-run relationship between the variables in the model, especially the population growth rate and Economic growth in Nigeria from 1983 to 2022. In furtherance to the above, the ARDL long run was estimated to evaluate the long run effect of the population growth rate as well as other explanatory variables on the Nigerian Economy. Based on the ARDL bound test, the F-Statistic exceeded the 10%, 5% and 1% level of significance.

Also, the Error Correction Model was estimated to examine whether or not the variables will adjust back to the long-run equilibrium if there is a distortion from the equilibrium point and at what speed.

3.4.3 Granger Causality Test

The Granger Causality Test was applied to determine whether past values of the population could predict future changes in Nigeria’s economic growth. This test helped us to understand the direction of causality between population growth and economic growth.

4. PRESENTATION AND ANALYSIS OF THE RESULT

This section presents the results of the study and a discussion of the findings.

4.1 Presentation of the Results

4.1.1 Stylized Fact

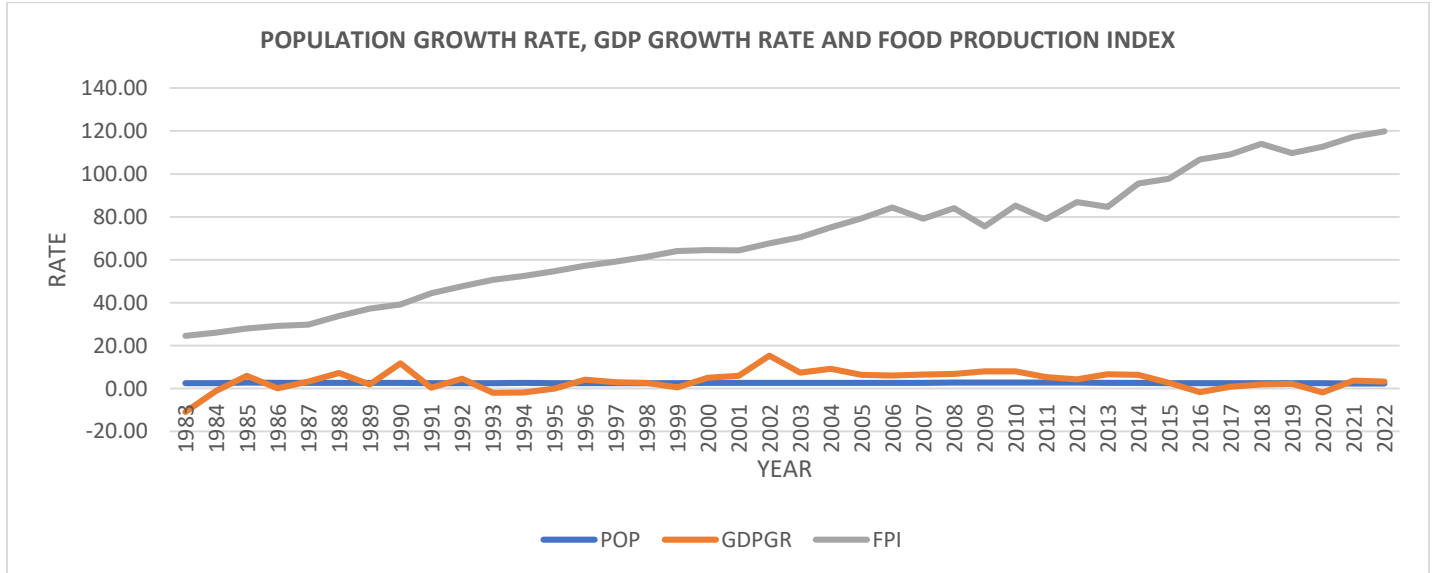


Figure 4.1: POP, GDPGR AND FPI (1983-2022)

Figure 4.1 shows the graphical trend of population growth, GDP growth rate and food production index. POP has maintained an almost constant trend during the study. In other words, there has not been a significant change in the rate of population growth over the years. GDPGR has increased and decreased over the period of the study, reaching negative growth in some periods. GRGDP exactly reached negative growth in 1983, 2016, and 2020, among others. This was based on the economic upheavals that were prevalent during those periods, especially the

outbreak of COVID-19 that became an economic vice in the early period of 2020, resulting in negative growth. GRGDP experienced its peak during 2002. FPI, based on the graph above, has experienced a continuous rise over the period of the study.

Table 4.1: Summary Statistics

A summary of the data collected from the various sources is presented in table 4.1.

| | GDPGR | FPI | FER | GFCF | INF | LNTGE | POP |
|--------------|-----------|----------|-----------|----------|----------|-----------|-----------|
| Mean | 3.697078 | 70.06000 | 6.054700 | 32.91223 | 19.18119 | 11.79263 | 2.595355 |
| Median | 3.921555 | 69.09000 | 6.083500 | 30.57397 | 12.94178 | 12.00779 | 2.581974 |
| Maximum | 15.32916 | 119.8500 | 6.775000 | 75.75651 | 72.83550 | 13.30027 | 2.764062 |
| Minimum | -10.92409 | 24.58000 | 5.143000 | 14.16873 | 5.388008 | 9.983919 | 2.380007 |
| Std. Dev. | 4.485305 | 28.06588 | 0.413913 | 14.93435 | 16.77084 | 1.021220 | 0.102061 |
| Skewness | -0.410941 | 0.083433 | -0.464739 | 0.641179 | 1.830368 | -0.400262 | -0.113311 |
| Kurtosis | 4.915060 | 2.013500 | 2.501572 | 2.950363 | 5.193504 | 1.920649 | 2.064090 |
| Jarque-Bera | 7.238239 | 1.668377 | 1.853935 | 2.744843 | 30.35407 | 3.009727 | 1.545476 |
| Probability | 0.026806 | 0.434227 | 0.395752 | 0.253492 | 0.000000 | 0.222048 | 0.461747 |
| Sum | 147.8831 | 2802.400 | 242.1880 | 1316.489 | 767.2476 | 471.7051 | 103.8142 |
| Sum sq. Dev | 784.6006 | 30720.06 | 6.681636 | 8698.360 | 10969.18 | 40.67271 | 0.406242 |
| Observations | 40 | 40 | 40 | 40 | 40 | 40 | 40 |

Source: Authors’ Computation 2024

Table 4.1 presents the descriptive statistics of the variables used in this study. There is a total number of 40 observations, based on the study period of 1983 to 2022. From the result, it is seen that the mean values were 3.6970, 70.0600, 6.0547, 32.9122, 19.1811, 11.7926 and 2.5953 respectively, while the standard deviation of the variables were 4.4853, 28.0658, 0.4139, 14.9343, 16.7708, 1.0212 and 0.1020 respectively. Given their means and standard deviation values in table 4.1, it is evident that the mean value of all the variables for this study exceed their respective standard deviations except for the gross domestic product growth rate. This implies that most of the variables are stable over the period of the study (1983-2022). Some of the variables except GDPGR, FER, LNTGE and POP were positively skewed toward normality as shown by the positive values of the skewness statistics of the variables. The Kurtosis statistic, which depicts the flatness of the graph of a frequency distribution, revealed that all the variables were normally distributed, given that their P-values were greater than the conventional 5% level of significance. The Jarque-Bera statistic shows that the variables are normally distributed.

4.3 Correlation Matrix

Table 4.2: Correlation Matrix

| | GDPGR | FPI | FER | GFCF | INF | LNTGE | POP |
|-------|---------|---------|---------|---------|---------|--------|-----|
| GDPGR | 1 | | | | | | |
| FPI | 0.1202 | 1 | | | | | |
| FER | -0.0700 | -0.9727 | 1 | | | | |
| GFCF | -0.4267 | -0.8182 | 0.7388 | 1 | | | |
| INF | -0.2833 | -0.3159 | 0.3002 | 0.3198 | 1 | | |
| LNTGE | 0.2359 | 0.8174 | -0.7444 | -0.8665 | -0.3293 | 1 | |
| POP | 0.5844 | -0.1793 | 0.3105 | -0.3161 | -0.1973 | 0.1417 | 1 |

Source: Authors’ Computation, 2024

The correlation matrix above explicates the absence of multicollinearity, which suggests that the independent variables do not correlate; this holds, given that most of the values are less than 0.8

4.4. Unit Root Results

The unit root test was performed to determine the level of integration and to determine the technique to be used for the analysis. This allowed for a well-rounded analysis and avoided spurious regression results as time series variables are characterized by a linear trend. The augmented Dickey-Fuller unit root test was adopted in this regard.

4.4.1 Augmented Dickey-Fuller (ADF) Test

The unit root test using the ADF test was conducted to ascertain whether the time series data were stationary or non-stationary and also to determine the number of times (the level) at which the variables have to be different before becoming stationary.

Table 4.3: ADF Test Result

| Variables | ADF t-Statistics | ADF P-values | ADF Level of Integration |
|-----------|------------------|--------------|--------------------------|
| GDPGR | -5.215487 | 0.0001 | I(0) |
| FPI | -2.968655 | 0.0473 | I(1) |
| FER | -3.166526 | 0.0302 | I(1) |
| GFCF | -3.494471 | 0.0134 | I(0) |
| INF | -4.753614 | 0.0005 | I(1) |
| LNTGE | -3.208069 | 0.0284 | I(0) |
| POP | -6.427500 | 0.0000 | I(1) |

Source: Authors’ computation, 2024

Given the computations in table 4.3, the ADF test shows that the variables were stationary at the level and after the first differencing. In other words, the variables are characterized by I(0) and I(1) series, which is a prerequisite to adopt the ARDL analytical technique. ARDL Bounds test is also presented to ascertain the existence or not of a long-run relationship among the variables used in the model.

4.5: ARDL Bounds Test

ARDL Bounds test was used to determine whether there exists a long-run relationship between the variables in the model. This test is only best for variables that are integrated at mixed orders of I(0) and I(1). This test is presented in table 4.4

Table 4.4: ARDL Bounds Test

| Model | F = 12.05277 | |
|--|--------------|-------------|
| GDPGR = f(POP, FPI, LNTGE, INF, FER, GFCF) | K = 6 | |
| Critical Values | Lower Bound | Upper Bound |
| 10% | 1.99 | 2.94 |
| 5% | 2.27 | 3.28 |

Source: Authors’ Computation, 2024

The result from the ARDL Bounds test shows that the value of the F-statistics (12.05277) is greater than the upper and lower bounds at both 5% and 10% levels of significance. This implies that there is a long-term relationship between population growth and economic growth in Nigeria, as shown by the long-term connection that bounds all the independent variables with GDPGR.

4.6: Summary of the Long-Run Estimate of ARDL

Table 4.5: ARDL Long Run Estimates

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| POP | 36.54674 | 7.165314 | 5.100508 | 0.0000 |
| LNTGE | -1.194112 | 0.552789 | -2.160160 | 0.0425 |
| INF | -0.047854 | 0.018330 | -2.610676 | 0.0163 |
| GFCF | 0.039194 | 0.083469 | 0.469561 | 0.6435 |
| FPI | -0.277517 | 0.077479 | -3.581813 | 0.0018 |
| FER | -24.17866 | 5.248010 | -4.607205 | 0.0002 |
| C | 93.12094 | 37.10105 | 2.509927 | 0.0203 |

Source: Authors’ Computation, 2024

The result of the long-run coefficient, as shown in the table 4.5 shows that Gross Fixed Capital Formation (GFCF) and Population Growth Rate (POP) have a positive effect on the Gross Domestic Product Growth rate (GDPGR) in the long run, as seen from the positive coefficients of these variables. Fertility rate (FER), Food Production Index (FPI), Inflation Rate (INF) and Total Government Expenditure (LNTGE), all have a negative influence on output levels in the long run, as seen from its negative coefficient. From the results above, this means that a unit increase in FPI will lead to a 0.06-unit increase in economic growth; a unit increase in FER will lead to a 22.5-unit decrease in economic growth; a unit increase in GFCF will lead to a 0.20-unit increase in economic growth; while a unit increase in INF will lead to a 0.21-unit increase in economic growth, a unit increase in LNTGE will lead to a 3.99-unit decrease in economic growth; a unit increase in POP will lead to a 77.75-unit increase in economic growth. The population growth rate, in the long-run, exerts a positive and significant effect on economic growth. Only GFCF is insignificant at the 5% level.

4.7. ARDL Short Run Test

Dependent Variable (GRGDP)

Table 4.6: ARDL Error Correction Regression Model

| Variables | Coefficient | Std. Error | T-Statistic | Prob. |
|--------------|-------------|------------|-------------|--------|
| D(FPI) | 1.302041 | 0.066377 | 19.61585 | 0.0324 |
| D(FER) | -13.93795 | 8.320218 | -1.675191 | 0.3426 |
| D(GFCF) | 0.410204 | 0.052092 | 7.874583 | 0.0804 |
| D(INF) | 0.297381 | 0.016324 | 18.21729 | 0.0349 |
| D(LNTGE) | -0.496575 | 0.271685 | -1.827760 | 0.3187 |
| D(POP) | 91.40978 | 7.916596 | 11.54660 | 0.0550 |
| CointEq(-1)* | -4.231744 | 0.167762 | -25.22468 | 0.0252 |

R-Squared = 0.9975, Adjusted R-Squared = 0.9891, Durbin Watson Stat = 2.4391

Source: Authors’ computation 2024

In the short-run analysis in table 4.6, the fertility rate and total government expenditure exert a negative effect on economic growth, while the population growth rate, food production index, inflation rate and gross fixed capital formation exert a positive effect on economic growth. Although the effects of POP, FER and LNTGE are

insignificant at the 5% level. The coefficient of the error term (4.2317) is rightly signed and statistically significant at the 5% level of significance. The coefficient implies that 42.31 % of the short-run disequilibrium in the previous year is corrected in the long-run. Also, the table indicates that the dynamic model is a good fit because the variations that occur in the criterion variable (GDPGR) are accounted for by the explanatory variables. To put in another word, the data fits the model well, given the value of the coefficient of determination (R-Squared). Essentially, the R-Squared value indicates that approximately 99.75% variations in the criterion variable are explained by the independent variables

4.8: Granger Causality Test

Table 4.7: Results of the Granger Causality Test

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|------------------------------------|------------|--------------------|--------------|
| FPI does not Granger Cause GDPGR | 36 | 1.09166 | 0.3805 |
| GDPGR does not Granger Cause FPI | 36 | 0.15343 | 0.9598 |
| FER does not Granger Cause GDPGR | 36 | 3.06011 | 0.0335 |
| GDPGR does not Granger Cause FER | 36 | 0.60009 | 0.6658 |
| GFCF does not Granger Cause GDPGR | 36 | 0.44899 | 0.7722 |
| GDPGR does not Granger Cause GFCF | 36 | 2.12014 | 0.1058 |
| LNTGE does not Granger Cause GDPGR | 36 | 1.56137 | 0.2131 |
| GDPGR does not Granger Cause LNTGE | 36 | 0.57549 | 0.6828 |
| INF does not Granger Cause GDPGR | 36 | 0.50325 | 0.7336 |
| GDPGR does not Granger Cause INF | 36 | 1.55831 | 0.2139 |
| POP does not Granger Cause GDPGR | 36 | 5.00484 | 0.0038 |
| GDPGR does not Granger Cause POP | 36 | 0.97583 | 0.4371 |

Source: Authors’ Computation, 2024

Table 4.7 shows the association between the variables employed in this study. The findings show that there is a uni-directional relationship between the population growth rate (POP) and economic growth (GDPGR) in Nigeria over the period of this study. It shows that population growth causes economic growth and economic growth does not cause population over the period of study. Also, there is a uni-directional causal relationship running from the fertility rate (FER) to economic growth (GDPGR) in Nigeria during this study. There is no causal effect between the other variables and economic growth over the study period.

4.9. Diagnostic Tests

Table 4.8: Summary of the Diagnostic Test Result

| Test | F-Statistic | Probability Value |
|--|--------------------|--------------------------|
| Jarque-Bera | 1.7097 | 0.4253 |
| Breusch-Godfrey Serial Correlation LM Test: | 0.5669 | 0.5766 |
| Heteroskedasticity Test: Breusch-Pagan-Godfrey | 1.0365 | 0.4598 |
| Ramsey RESET | 0.0129 | 0.9107 |

Source: Authors’ Computation, 2024

From table 4.8, it appears that the model follows a normal distribution. This notion is based on the fact that the probability value of the Jarque-Bera Statistic is greater than the conventional level of significance (5%). In other

words, the result indicates that the error term in the model is normally distributed. With an F-statistic of 0.5669 and a probability value of 0.5766, the Breusch-Godfrey Serial Correlation LM Test indicates that the model is free from serial correlation. The Heteroskedasticity Test: Breusch-Pagan-Godfrey, which is given by its F-Stat and probability value of 1.0365 and 0.4598, respectively, shows that the model is heteroskedastic and that the error terms have constant variance. Lastly, considering the F-statistic and probability value of the Ramsey RESET test, which were 0.0129 and 0.9107, respectively, it follows that there is no specification error in the model. Overall, the model passes all the tests as evidenced in the findings above.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

This study examined population growth and economic growth in Nigeria using time series data that ranged from 1983 to 2022. The study adopted a combination of the qualitative and quantitative techniques for data analysis by describing the variables using graphs and presenting an econometric analysis of the data. The specific objectives that the study achieved include analyzing the effect of population growth on Nigeria's economic performance and determining the causal relationship between population and economic growth in Nigeria. The econometric analysis that was carried out included the descriptive statistics of the variables as well as their correlation matrix. The augmented Dickey–Fuller test was used to test for the stationarity of the variables. The ARDL bound test, the ARDL long run test as well as the ECM were all used to investigate the relationship between the variables (dependent and independent variables). The granger causality test was employed to examine the causal relationship between the variables.

The data for the analysis were obtained from secondary sources mainly from the CBN Statistical Bulletin and World Development Indicators (WDI). The methodology of the study comprised of a single model with the Growth Rate of Gross Domestic Product (GDPGR) as the dependent variable while the independent variables include Population growth rate (POP), Food Production Index (FPI), Fertility rate (FER), Inflation (INF), Gross Fixed Capital Formation (GFCF) and Total Government Expenditure (LNTGE). The ARDL Bound test revealed that the criterion and explanatory variables are bound by a long-run relationship. Based on the long-run estimates, Gross Fixed Capital Formation (GFCF) and Population Growth Rate (POP) have a positive effect on the Gross Domestic Product Growth rate (GDPGR), while the Fertility rate (FER), Food Production Index (FPI), Inflation Rate (INF) and Total Government Expenditure (LNTGE) all have a negative influence on output levels in the long run. On the same hand, the short-run test result revealed that while the fertility rate and total government expenditure exert a negative effect on economic growth, the population growth rate, food production index, inflation rate and gross fixed capital formation exert a positive effect on economic growth. Although the effects of POP, FER and LNTGE are insignificant at the 5% level. The ECM was also correctly signed to show that any disequilibrium does not hesitate to correct back to equilibrium.

The result from the Granger causality test also showed that there is a unidirectional relationship running from population to economic growth. This implies that population growth is a driver of economic changes.

5.2. Conclusion

From the study, there is a positive relationship between population growth and economic growth in Nigeria for the period under consideration. It is evident that Population growth is a critical demographic factor influencing economic growth. This study has revealed that population is not a constraint to the nation but rather a blessing in disguise, especially when it is being harnessed for human capital development, as in China and India. Adequate

efforts and measures should be undertaken on how best to use this large population to form an effective and productive labor force to drive sustainable growth in Nigeria while addressing the challenges that come with this increase.

5.3. Recommendations

Based on the findings, several recommendations are proposed to enhance the positive effect of population growth on Nigeria's economic performance:

1. The Nigerian government should embark on sensitization programs to enlighten the Nigerian populace on the need to check the fertility rate, and policies that enhance family planning should be adopted to put the population growth in check in Nigeria.
2. Increase investments in agriculture to improve food production and ensure food security. Modernization of agricultural practices and expansion of irrigation systems to boost productivity.
3. Enhance access to quality education and health care to improve labor productivity. Also, introduce skills development programs aligned with market demands to reduce youth unemployment.
4. Address infrastructural deficits, particularly in power supply, transportation, and housing, to support economic growth and accommodate a growing population. Encourage public-private partnerships (PPPs) to fund and manage infrastructure projects.

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