

“Population growth and food security: Evidence from Nigeria”

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POPULATION GROWTH AND FOOD SECURITY: EVIDENCE FROM NIGERIA

Abstract

The average agriculture output growth between 2011–2020, which stood at 3.5% against the backdrop of over 2.6% population growth rate, accounts for the present food insecurity, hunger, and malnutrition in Nigeria. The study aims to examine the impact of population growth on food security in Nigeria with data covering 1986–2020. The study employed two models: the first model analyzed agriculture output as a function of population growth rate. The second model examined the impact of population growth and agriculture productivity on economic growth. The Cochrane-Orcutt iterative method on an ordinary least squared (OLS) was employed. The study results found that population growth had a significant impact on agriculture output. However, the paper further substantiated that economic growth is significantly and positively responsive to changes in agriculture output and population growth rate in Nigeria. Among other things, the study recommended the government consider an increase in budget allocation to the agriculture sector so as to boost food output. Finally, the government may also consider introducing a policy that would encourage small families, thereby reducing the country's population growth rate.

Keywords

food insecurity, population growth, economic growth rate, OLS method, Nigeria

JEL Classification

C53, E21, E27

INTRODUCTION

The issue of food insecurity and the constantly growing population has been of more significant concern in developing countries, most especially in sub-Saharan Africa (SSA) economies. This is particularly observable in Nigeria with a population growth rate of about 2.7% of largely unemployed and mostly young people (Iwu, 2020). In most cases, the agriculture sector has been abandoned to the rural poor for reasons ranging from lack of social amenities in the rural communities to total loss of interest in agricultural engagement by the youth. The result is declining food production leading to high prices of agricultural products and food insecurity.

The available statistic indicates that about 14 million people, including children, are malnourished in Nigeria (Owoo, 2021). Iwu (2020) submitted that, on average, about 21.4% of the population in Nigeria suffered hunger between 2018 and 2020. This is why in the last decade, there has been prevalence of severe food insecurity in Nigeria that has continued to increase whilst the demand for food rises amidst a very fast-growing population. Otaha (2013) averred that human ability to undertake economic activities is predicated on food security and production availability. He further argued that the level of food insecurity in Nigeria during the last four decades has increased due to neglect of the agriculture sector occasioned by the discovery and export of crude oil in the early 1970s. In addition, the reason may be neo-liberal economic policies, which were adopted by the government. The policy

led to a devaluation of the naira, trade liberalization, as well as privatization and commercialization of government-owned enterprises. The result is that cases of undernutrition and malnutrition are daily reoccurrence, thereby leading to a decline below the accepted international standard in food intake requirements of most Nigerians (Otaha, 2013).

The worry in Nigeria today is that the rapidly growing population is capable of making the country unable to feed its citizens amidst vast unutilized land mass and other natural resources. This situation has been described as a bewildering paradox. For instance, the 1991 census estimated the country's population at 87.5 million, which grew to over 140 million in 2006, and by 2020 has been estimated at 206.1 million (World Bank, 2020). According to the statistics, Nigeria's population has grown at an average rate of 2.6% between 2000–2020. When compared to some West African countries such as Ghana with a population of 31.1 million and a population growth rate of 2.4%, Benin Republic with 12.1 million and a population growth rate of 2.8%, and Niger with 24.2 million and a population growth rate of 3.8% in the same period, it is revealed that the West African neighbors have increasing population growth rate than Nigeria. However, the worry is that the increasing population growth rate has not kept pace with food production, which accounts for massive food imports that gulped a substantial amount of import bills over the last few decades.

According to Iwu (2020), a total of N334.3 billion was spent on importations comprising mainly foodstuffs, beverages, tobacco, spirits, and alcohol between January and June 2019, representing a total increase of 47% over the preceding year, 2018. In order to boost agriculture productivity and ensure food security, successive governments in Nigeria have embarked on different policies and programs aimed at accelerating productivity in the agriculture sector. These included Operation Feed the Nation of 1976–1980 by the regime of General Olusegun Obasanjo, the Green Revolution of 1980 introduced by Alhaji Shehu Shagari as well as Directorate for Food, Road and Rural Infrastructure in 1985/86 during the Gen Babangida administration (Abdulrahman, 2013b; Aiyedogbon et al., 2022). In addition, in 1986, the Structural Adjustment Programme (SAP) policy was introduced to ensure market-oriented policies in agriculture activities, thereby stirring increased private sector participation in food production and export.

Furthermore, the government has made previous efforts to improve food supply via agricultural output, but these efforts have generated limited benefits. National Root Crops Production Company, National Grains Production Company, Western, North-east, Nigerian National Shrimp Company, Nigerian National Fish Company and North-East are among the organizations involved. In 1989, the government established these businesses intending to integrate people in the direct production of food. Wheat, cassava, maize, millet, and sorghum are among the key crops addressed. There were equally 11 River Basin Development Authorities established to improve river basins for significant productivity from the agricultural sector to make the country agriculturally self-sufficient.

Nonetheless, rather than addressing the issue of food insecurity in the country, the programs served to alienate peasant farmers in Nigeria, who were the primary producers of food. As a result, the programs favored large-scale commercial and capital-intensive farming, which profited themselves at the cost of impoverished peasant farmers via corruption (Matemilola & Elegbede, 2017; Otaha, 2013).

1. LITERATURE REVIEW

The concept of food security emerged in the literature some few decades following the high population growth rate in most SSA countries with declining food production index. According to Adebayo (2010), the idea came up in 1974 during

the world food conference that emphasized adequate food at the national level. Accordingly, food security has been defined in various ways by different authors.

In the view of Adetiloye (2012), food security is a situation that affords the citizens access to ad-

equate food at affordable costs at all times, thereby making them active and living a healthy lifestyle. The study stressed the importance of food availability with all essential nutrients that will ensure safe and consistent living without resorting to stealing, scavenging, and other shortcuts to make a living. On the other hand, Abdulrahman (2013a) defined food security as the ease of making available food produced domestically to the majority of the population at a price that is affordable to all. As a result, if food security refers to a country's ability to make food readily available to its citizens at reasonable prices, food insecurity refers to a country's inability to provide and secure a sufficient quantity and quality of food to its citizens as a result of high demand, agricultural commodity shortages, and low per capita income (Abdulrahman, 2013a).

Bremner (2012) and Zhuravka et al. (2021) opined that food security presupposes a situation where everyone has access to sufficient food in both physical and economic dimensions to meet the dietary needs for a healthy lifestyle, thereby boosting productivity. In this regard, access to food implies food affordability to individuals and households. This concept emphasizes the importance of people and families in a nation having access to nutritious, adequate, and safe food in order to live a healthy lifestyle. According to Gueye et al. (2013), food security is a critical prerequisite for human capacity development because well-nourished individuals are more educated to utilize new technologies. Moreover, it encourages them to engage the community with fresh ideas and impetus. Therefore, food security can be referred to as the access to food availability. As a result, household food security may be defined as the absence of hunger or the threat of famine among household members (FAO, 2001 cited in Otaha, 2013).

Food security, according to Osu (2017), is a scenario in which all people have economic, social, and physical access to nutritious, safe, and enough food to suit their dietary requirements and food choices for a healthy and active life. A household's food security refers to all members having access to adequate food at all times to live a healthy and active life. According to the World Bank (2006), food security is defined as everyone having adequate food at all times to live an active and healthy

life. According to the Economic Commission for Africa, it includes not just food availability via storage and commerce, but also food access through a home or domestic production. This is why, according to FAO (2010), in order for a nation to ensure long-term food security, food supply must keep up with population growth and urbanization. As a result, FAO (2010) believes that tackling agricultural as well as population expansion is critical to attaining food security.

Population, on the other hand, is defined as the total number of individuals living in a certain place during a given period. Gee (1999) posited that population growth is the change in the size of the population as a result of the difference between death and birth evaluated in both relative and absolute terms. This is why, according to the Index Mundi (n.d.), population growth is defined as the average yearly variation in a population that influences the death and birth rates and equals the overall difference in emigrants and immigrants over a certain period in a nation. Some individuals believe that expanding a country's population is beneficial. Johari (2015) suggested that a high population is beneficial to a nation in various ways. However, he overlooked the fact that a state's growing population may also be a cause of fear. When the food supply level, according to this assumption, cannot keep up with the rise in the demand for food, population growth becomes a cause of anxiety and concern.

From the domain of empirical literature, few studies exist that have assessed the relationship between food security and population growth rate. Thus, Babatunda et al. (2007) studied the socio-economic impact of food security on farming households in Kwara State. A sample of 94 respondents was collected for the study. The study found evidence of food security for about 36% of household members in the sample, while 64% were food insecure. Fayeye and Ola (2007) evaluated the relationship between food security and improvement in the health of people in SSA. The study observed that about 30 to 45 countries in SSA suffered acute malnutrition and abject poverty occasioned by the severe food crisis.

Akpan (2009) examined the impact of oil resource management on food insecurity in Nigeria.

Utilizing the vector autoregressive (VAR) model, the study found evidence that neglect of the agriculture sector was occasioned by the overdependence on oil export, resulting in a decline in food outputs. G. Wilson and K. Wilson (2013) employed co-integration to assess the impact of population growth on food security in Nigeria. It was discovered by the study that population growth had a significant negative impact on food security. Finally, Abdulrahman (2013b) assessed the impact of population growth on food security in Nigeria for a data period of 2000–2012. Using an ordinary least square (OLS) on a linear regression model, the study found that population growth had a significant positive impact on food security in Nigeria.

In his study on food insecurity, Peters (2015) assessed how population growth and savings affected agricultural food output in Nigeria. The study observed that investment in agriculture is negatively affected by population, thereby affecting agricultural output with its concomitant impact on food import bills. Osu (2017) examined how population growth affected Nigeria's food security. The study disaggregated food production into crop, fishery, and livestock productions. Using correlation and granger causality techniques, the study found that a significant proportion of the population accounted for the presence of the food crisis in Nigeria. Oguntegbe et al. (2018) scrutinized the relationship between the index of food production and the growth rate of the population in Nigeria for a data period of 1980–2011. The granger causality approach, OLS, and two-stage least square (2SLS) methodologies were employed for the analysis. Accordingly, findings indicated that the population growth rate had a significant positive impact on the index of food production, contrary to a negative relationship from 2SLS model. Therefore, the study suggested against further increase in the country's population.

Iwu (2020) averred that an excessive population growth rate has been a significant cause of food insecurity in SSA. He studied population and food security using Ekiti and Ondo States, emphasizing yam, fruit, and cassava farmers. Employing an array of descriptive approaches, the study identified bad roads, high transportation costs, inadequate market, and weather as the major factors militating against food security in Nigeria. The

study, however, failed to test the impact of population growth, a key variable in the study, on food security. Owoo (2021) documented a recent study on how demographic considerations affected food security of households in Nigeria. The study employed the fixed effects regression. The findings indicated that larger households faced more problems of food insecurity in Nigeria.

Therefore, a review of the literature suggests that empirical studies on the relationship between population growth and food security, particularly in Nigeria's case are being scarcely pursued. Thus, this study aims to investigate how increased population growth has affected food security using farm production as a proxy.

2. METHODOLOGY

A linear regression using the ordinary least square is employed in analyzing the relationship between population growth and food security on the one hand and how these two variables affected economic growth in Nigeria on the other hand. The data on agriculture output and GDP were culled from the Statistical Bulletin of the Central Bank of Nigeria, while the data on population was sourced from the World Bank databases covering the period 1986–2020. Accordingly, the study developed two models as follows:

Model 1

$$AGO = f(POP). \quad (1)$$

In log stochastic term, equation (1) becomes:

$$\ln AGO_t = \alpha + \beta \ln POP_t + \varepsilon_t. \quad (2)$$

Model 2

$$GDP = f(AGO, POP), \quad (3)$$

$$\ln GDP_t = \beta_0 + \beta_1 \ln AGO_t + \beta_2 \ln POP_t + \varepsilon_t, \quad (4)$$

where *AGO* – output of the agriculture sector (a proxy for food security); *POP* – Nigeria's population; *GDP* – gross domestic product at 2010 constant prices; α & β – constants; β_i – parameters to be estimated; ε – white noise error term.

To ensure that a non-stationary series is not included in the model, the Augmented Dickey-Fuller (ADF) test was employed to ascertain the level of stationarity of the variables.

3. RESULTS AND DISCUSSION

The structure and behavioral trend of food security and the population growth rate in Nigeria are presented with relation to the growth performance of the Nigerian economy. This can be seen in Table 1 where the output of the agriculture sector was consistently less than double-digit except for 2001–2005, which recorded an increased output of 16.0%. The agriculture output from 2011 to 2020 hovered between 2.2% and 6.7%, with the highest growth recorded in 2012 and the lowest in 2020. Undoubtedly, the Covid-19 pandemic affected every sector of the economy, including the agriculture sector.

Table 1. Structure of food security and population growth in Nigeria (%)

Source: World Bank (2000).

Year	Agriculture output	Nigerian population growth rate	GDP at 2010 constant price
1986–1990	5.0	2.6	4.8
1991–1995	2.8	2.5	0.2
1996–2000	4.0	2.5	3.1
2001–2005	16.0	2.6	8.8
2006–2010	6.1	2.7	7.3

Year	Agriculture output	Nigerian population growth rate	GDP at 2010 constant price
2011	2.9	2.7	5.3
2012	6.7	-0.4	4.2
2013	2.9	5.9	5.5
2014	4.3	2.7	6.2
2015	3.7	2.7	2.8
2016	4.1	2.7	-1.6
2017	3.4	2.6	0.8
2018	2.1	2.6	1.9
2019	2.4	5.5	2.3
2020	2.2	0.0	-1.9

Evidently, this suggests low productivity in the agriculture sector when compared to the average population growth of about 2.6% in the period under review. Similarly, it can also be seen from Table 1 that as a result of the poor performance of the agriculture sector amidst increasing population, economic growth does not perform very well. For instance, the economy recorded a near-zero growth rate between 1991–1995, while the best period for the Nigerian economy since the present democratic dispensation occurred during 2001–2005, which saw an all-time high growth rate of 8.8%. The moderate performance of the economy in this period was occasioned by the rising price of crude oil on the global market. It continued on a progressive trajectory up to 2014, when a 6.2% growth rate was recorded for the economy. The growth of the economy declined in 2015 and finally went into recession in 2016, for which the economy had not fully recovered before the advent of

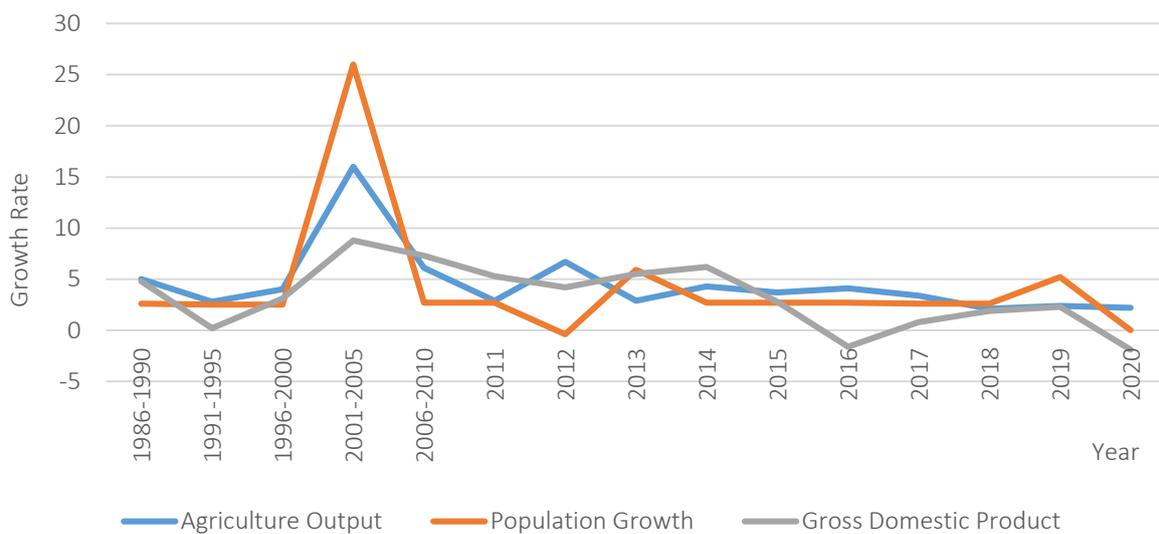


Figure 1. Trend of food security and population growth in Nigeria

the coronavirus pandemic in December 2019 that disrupted the world economy. This behavioral trend of the variables is depicted in Figure 1.

Table 2 shows that the series are non-stationary as the ADF indicates first-order stationarity for agriculture output and population while GDP was only stationary at the integration of order 2. On the other hand, the PP test indicates stationarity for all three variables at the integration of order one at a 5% level of significance.

Table 2. Results of unit root test

Source: Authors' computation using EViews 9.0.

Variable	Augmented Dickey-Fuller (ADF) test			Phillips-Peron (PP) test		
	Level	First Diff	Order	Level	First Diff	Order
LAGP	-1.85	-3.64	1	-1.82	-5.58	1
LPOP	-1.15	-5.67	1	-2.85	-9.47	1
LGDP	-1.53	-4.38	2	-1.73	-3.84	1
C.V = 5%	-3.55	-3.56	-	-3.55	-3.56	-

Models estimations are presented in Tables 3 and 4.

Table 3. Model 1

Source: Extracted from EViews 9.0.

Variable	Coefficient	Std. error	t-statistics	Probability
Constant	-1.71	2.29	-0.75	0.46
LPOP	-2.17	0.45	-4.78	0.00
AR(1)	0.87	0.10	8.38	0.00
R ² = 0.98, DW = 1.92, F stat = 11.65				

Note: Regression estimation, Method: Least Square, Dependent variable: AGP.

Table 4. Model 2

Source: Extracted from EViews 9.0.

Variable	Coefficient	Std. error	t-statistics	Probability
Constant	2.35	0.94	2.50	0.01
LAGP	0.34	0.07	4.58	0.00
LPOP	1.02	0.24	4.25	0.00
AR(1)	0.89	0.08	27.25	0.00
R ² = 0.99, DW = 1.87, F stat = 8.67				

Note: Regression estimation, Method: Least Square, Dependent variable: GDP.

In conducting the study in both models, a certain exception was observed, namely the presence of autocorrelation. As a result, the Cochrane-Orcutt iterative method through the AR(1) process was employed to correct the serial correlation problem. Thus, the R² and F sta-

tistics in both models are robustly satisfactory even as the DW statistics indicate the absence of serial correlation. Therefore, in Model 1 shown in Table 3, population had a significant negative impact on agriculture output. In addition, the constant is significantly negative. This implies that in the absence of population, productivity in the agriculture sector is negative as labor is required to work in every sector, including the agriculture sector.

The negative impact of population growth on agriculture output is a suggestive of food insecurity in Nigeria as earlier envisaged by Fayeye and Ola (2007), Akpan (2009), G. Wilson and K. Wilson (2013), Peters (2015), Oguntegbe et al. (2018), and Owoo (2021). In the case of Model 2, the study ascertained to what extent agriculture productivity and population growth affected economic growth in Nigeria. It was observed in Table 4 that agriculture output and population growth had a significant positive impact on economic growth in Nigeria. These findings are essential because they stress the need to have population growth that will keep pace with food productivity.

For instance, in the last few years in Nigeria, the level of hunger has increased as many families cannot feed themselves as a result of the hike in food prices. Several factors were responsible for the increase in prices, but two of these were notably more pronounced. This included scarcity of food occasioned by rising insecurity that scared away farmers, as well as the fact that most of the foods consumed in Nigeria were imported at exorbitant prices, thereby making them above the reach of the common person. The result is hunger and malnutrition. For example, the fear of Boko Haram Terrorists (BHTs) and banditry has become the beginning of wisdom in the northeast and northwest. High levels of violence have been reported throughout the areas, resulting in reduced agricultural activity, reduced displacement, and humanitarian access, with many people being relocated many times. This, along with much higher-than-average basic food costs, limits family buying power and access to food. As a consequence, most of the northwest and northeast experienced crises and emergencies.

Furthermore, since humanitarian access has deteriorated in recent years due to increasing violence and displacement, many families in hard-to-reach locations face huge food consumption gaps, indicating excess mortality and acute malnutrition. The danger of famine will continue to exist as these people struggle to satisfy their food demands. According to current data, about 690,000 individuals have been relocated in the country's North-central and Northwest regions, interrupting family participation in traditional subsistence activities (FAO, 2021). The increase in the level of insecurity has been responsible for disruption in agricultural farming seasons in Nigeria as most farmers are prevented from being engaged in land preparation, planting, weeding, and harvesting. High input prices for products like better seeds, herbicides, and fertilizers have added to the insecurity issue, limiting agricultural development to a level that is now below average.

Similarly, most families displaced in the northeast relied on host communities that are vulnerable to their basic needs as a result of insurgency. Thus, host communities became even more impoverished, exposing them to food insecurity and malnutrition. In addition, many farmers have been unable to carry out their farming activities due to incessant attacks and constant looting, resulting in the loss of farm products, low harvests, productive assets, and low purchasing power. Statistics from FAO revealed that between March and May 2020, at least 9.2 million people in the country have been confronted by various crises or worsened levels of food insecurity due to armed conflicts, Covid-19's effects, and climate change (FAO, 2021). Approximately 3.2 million people live in Yobe, Borno, and Adamawa states out of these totals. Except for the adoption and implementation of strict humanitarian actions, the figure is expected to rise to over 12.8 million between June and August 2021, with 4.4 million living in the three northeastern states.

CONCLUSION

Over the last few years, the issue of food insecurity has taken center stage in national discourse as cases of hunger and malnutrition abound in Nigeria, especially in the northern part of the country. To avert the impending problem of food insecurity, people began to agitate about the need to check the fast-growing population, which, according to the World Bank statistics, is over 2.6%. Therefore, the study examined the extent to which population growth affected the level of food security in Nigeria, with data spanning 1986–2020.

The study employed descriptive and econometric analyses. It was observed by the study that the level of population growth had a debilitating impact on food security in Nigeria. However, the study found evidence to suggest that population and food security are key determinants of economic growth in Nigeria. The primary conclusion that can be drawn from the study is that increasing population might be good or bad depending on the ability to keep pace with an increase in food productivity in an economy. Therefore, it is recommended that the government consider an increase in budget allocation in the agriculture sector to boost food output. In addition, rewarding incentives should be given to all those willing to take up a career in agriculture, particularly the youth, thereby fast-tracking the current diversification drive of the government. Finally, the government may consider introducing a policy that will encourage small families, which will lead to a decline in the country's population growth rate.

AUTHOR CONTRIBUTIONS

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Writing – review & editing: John O. Aiyedogbon.

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