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Population Growth Dynamics And Food Security In Cross River State, Nigeria.

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Abstract

This study investigated the prediction of population growth dynamics and food security in Cross River State, Nigeria. To achieve the purpose of this study, one research question, and hypothesis was formulated to guide the study. Literature review was done according to the sub-variable of the study. The correlational survey research design and trend analysis study approach was adopted for the study. The area of the study was Cross River State, Nigeria. The population of the study comprised the population of Cross River State relative to population growth dynamics and food security between 2015-2021. Purposive sampling technique was adopted for the study. The sample of the study comprised secondary data of the sub-variable of population growth dynamics and food security of 2015-2021 in Cross River State. The instrument developed for this study was population growth dynamics inventory and food security inventory. Simple linear regression and trend analysis curve were used to test the hypothesis and analyse the trend respectively. The result of the analysis showed that birth rate significantly predict food security in Cross River State, Nigeria. Based on the findings it was recommended among others that Government and Non-Governmental Organizations (NGOs) should take proactive measures to promote family planning and reproductive health education to reduce unnecessary birth rate and ensure long-term food security.

Introduction

Food security is a contemporary global issue particularly in developing nations which Nigeria is one of the affected countries. In the early 1960s, Nigeria was one of the world's most promising agricultural producers. However, with the discovery of oil in 1970's, things started changing gradually, and later so rapidly that agriculture has lost its place in the Nigerian economy. As oil prices went up, massive importation of food continued unabated,

food import bills were easily borne through the huge revenue that was accruing from oil sector. This led to the killing of subsistence farmers' initiatives, and waned interest in agriculture which marked the beginning of decline in agricultural production (Ojo & Adebayo 2012). The agricultural sector which was the main stream of Nigeria economy has been neglected. Since the discovery of crude oil (Ojong, 2016), there has been a shortfall in domestically produced food in Nigeria and growth in the population has become high compared to food production. This means that demand for food is greater than supply, the consequence of which can put food security to jeopardy. Food security occurs when all people at all times have access to sufficient, safe and nutritious food to meet their dietary requirement for an active and healthy life. The committee of World Food Summit (WFS, 2012) identified four pillars of food security to be: food availability, Food accessibility, food utilization and food stability.

Food availability is the quantity of food that is present in an area or country at a particular time, supplied through all forms of domestic production, import, food aid and food stock, World Food Program (WFP, 2009). In the same way, United State Department of Agriculture (USDA) also described food availability as the ready availability of nutritionally adequate and safe foods. Food availability is not just described in terms of countries or areas but also talked in micro levels i.e village and households level. Availing food thus focuses on two major conditions of food security as food in sufficient quantity and food at consistent basis. To fulfill these conditions, there must be adequate food production or otherwise adequate stock procured from elsewhere through trade or aid in a given area.

The available amount of food at the international, national and regional level does not mean it is accessible at household level. It must be accessible and affordable locally. Apart from food availability and accessibility, food has to be utilize. Generally, utilization is the way by which the body makes use and benefit from nutrients in the food. Good feeding practice and care must have positive nutritional impact on people and this can be achieved through sufficient energy and nutrient intake by individuals thereby contributing a healthy nation at large. Food utilization is determine by quality and safe food, nutritional value, hygiene practices and method of preparation, preservation of food as well as safe drinking water, feeding pattern and sharing practices within the household.

Over the years, the world population keep increasing rapidly, the population of the world is said to be a total of 7,874,965,825 (United Nation, 2019) According to World Bank (2009) between the period of 1980 and 2000, the world population rose from 4.4 to 6.0 billion with the figure projected to rise to 9.2 billion in 2050. It is an established fact that the world population is increasing on daily basis. The concern is on the rate of population growth at geometrical progression as to food at arithmetic progression as postulated by Reverend Robert Thomas Malthus. Food and Agricultural Organization (FAO), World Health Organization (WHO) as well as other National and International Organization (NIO) reported that their concern is on calamity that might befall billions of people that have no access to food if necessary precautions are not taken, as millions of people are dying and suffering from hunger

and food related diseases. Eboh et al (2012) observed that Nigeria is the most populous country in Africa but despite the high rate of her population increase, agricultural production is rather declining instead of increasing, the author also posited that land reform is a sine qua non just as radical intensification of farm production in the 774 local government areas of the country will go a long way in revamping food production. The world food is expected to grow by 60 percent towards 2050 (FAO, 2015) on this note, the possibility of the earth population out growing it feeding capacity is there as put forward by Thomas Malthus (1798) in his work titled Essay on the principles of population growth.

Factors responsible for food insecurity might be such as birth rate. Population of an area can increase through natural or artificial factors. Birth rate is an important determinant of population growth and age structure of populations and this factor have profound socio-economic implication. Birth rate is the number of individuals born at a given time and it is stated as a number of individuals born per year per 1000 in the population. Birth rate of younger population tends to grow faster because the birth rate is higher as a result of early marriage, fertility treatment drugs, which allows multiply fertilized eggs to be injected leading to the birth of twin, triplets or quadruplets children at a time. Millions of people all over the world lack access to adequate and quality food especially in developing nations and this has posted great challenges and concern to the United Nations as captured in their Sustainable Development Goal (SDG) to fight hunger, poverty and starvation worldwide and ensure environmental sustainability. Target A is to end hunger by 2030 and ensure all people including the poor and people in vulnerable situations have access to safe, nutritious and sufficient food all year round, target B is to end all forms of malnutrition by 2030 and target C is to double the agricultural productivity and become a small scale food producers, indigenous people as well as family farmers.

Statement of the problem

In Nigeria, the prevalence of food insecurity and undernourishment keep increasing year in year out. The population suffering from moderate food insecurity increased from 36.5% between 2010 and 2014 to 57.7% between 2018 and 2022, in the same period, the population of those suffering from severe food insecurity increased from 6.6% between 2010 and 2014 to 21.4% between 2018 and 2022 while the population of undernourishment doubled from 7.1% between 2010 and 2014 to 14.5% between 2018 and 2022. In Cross River State, The population suffering from moderate food insecurity increased from 20.5% between 2010 and 2014 to 43.1% between 2018 and 2022, in the same period, the population of those suffering from severe food insecurity increased from 5.6% between 2010 and 2014 to 11.2% between 2018 and 2022 while the population of those suffering from undernourishment increased from 6.1% between 2010 and 2014 to 15.3% between 2018 and 2022.

Although many efforts and policies have been put in place at global and national level to curb the issue of food security, global policy such as U.S Government Feed the Future Initiative 2012, national policies such as farm settlement scheme 1959, Land Army 1966/67, Gargantuan importation of rice (Rice Amada) by General Yakubu Gowan government in 1970s. Others are National Accelerated Food production project (NAFPP) 1974, Agricultural Development Programme (ADP) 1975, Operation Feed the Nation (OFN)

1976, Green Revolution of 1980, Mobile Food Bank by Excellency, Senator, Governor Ben Ayade, 2016, Directorate for Food Road and Rural Infrastructure 1985/86, Central Bank of Nigeria (CBN) Anchor and Borrowers Programme, National Special Programme on food security 2007. Despite all these efforts, food insecurity remains a serious challenge in Nigeria and specifically in Cross River State. The poor experiences of the masses in food insecurity in terms of production, availability and accessibility is worrisome and alarming. Meanwhile, the population growth dynamics such as birth, mortality, migration and marriage are major factors that constitute threat to the food insecurity. It is against this backdrop and worried by the crises that may erupt with the increase in population and a decline in food production in the Cross River State, that the researcher investigated the question: does population growth dynamics variable (birth rate) predicts food security in Cross River State, Nigeria?

Purpose of the study

The purpose of the study was to investigate if Population Growth Dynamics predict food security in terms of production, availability and accessibility in Cross River State, Nigeria. The Study specifically sought to:

Examine if birth rate predicts food security in terms of production, availability and accessibility in Cross River State between 2015 and 2021.

Research question

One research question was posed for the study as follows;

To what extent does birth rate predict food security in Cross River State, Nigeria?

Statement of hypotheses

One statement of hypothesis was formulated thus;

Birth rate does not significantly predict food security in Cross River State

Conceptual framework

Population growth according to Gee (2009) is the change in population size, depending on the balance of birth and death measured both in relative and absolute terms. This implies that population of a place increases as people are born or immigrate into a country or place and decreases as people die or emigrate. This increase can ocean when birth rate is higher than the death rate or when immigration is more than emigration or when these factor come into play.

Similarly, Snide, and Brimlow, (2013) defined population growth as changes in the size of population over time. That is to say, population growth is the increase in the number of people in a population of a given geographical location be it clustered or dispersed group and that is why the grobal population has growth from 1 billion in 1800 to 7.9 billion in 2020, the united nation projected population to keep increasing and has estimated the total population at 8.6 billion by 2030, 9.8 billion by 2100 UN (2017).

Population growth is the change that occurs in amount of individual in an area or place over time. This implies that to find the growth rate of population, the number of persons moving into an area or place minus the number of individual moving out of an area or place, thereby taking the birth rate, adding the immigration rate and subtracting the death rate and emigration rate, Bankole (2010).

Empirical review

Birth rate and food security

Ede (2016) conducted a study on variables of population growth and food security in Esan Education Zone of Edo State, Nigeria using descriptive survey design and adopted simple random sampling technique to select a sample of 550 respondents from a population of 1850 registered farmers from the area of the study. Questionnaire was the main instrument used for data collection. One-way analysis of variance (ANOVA) was the statistical tool adopted for the study. The result of the findings revealed that birth rate as a variable of population growth significantly influences food security and sustainability and therefore recommended that policy makers should formulate stiff policies and also carry out aggressive counselling services to control birth rate in order achieve food security.

Likewise, in a study carried out by Ndifon (2015) on determinants of population density and impact on food availability in Uyo Education zone of Akwa-Ibom State, Nigeria; the researcher adopted ex-post fact design for the study. The population of the study was 1300 rural inhabitants, while the sample was 650 respondents drawn from the area of the study using stratified and simple random sampling techniques. Questionnaire and one-way analysis of variance (ANOVA) were the instrument used for data collection and statistical tool used for data analysis respectively. The result of the study showed a significant influence of birth rate as population density determinant on food availability and security. Based on the findings, it was recommended that governments at various levels should ensure the implementation of birth control policies in order to achieve food availability and security.

Moreover, Nuhu (2018) conducted a study on birth control policy in Kategum Education Zone of Bauchi State: A veritable tool for food security. The researcher adopted for the study descriptive survey design and used stratified and simple random sampling techniques to select a sample of 260 respondents from a population of 866 indigenes from the area of the study; with questionnaire as the main instrument for data collection. The statistical analysis tool adopted for the study was Pearson product moment correlation. The result of the study revealed that implementation of birth control policy enhances food security, and therefore recommended among others that governments and non-government organisations (NGDs) should carry out regular awareness campaigns and counseling services to reduce birth rate among citizens.

Furthermore, Adebanjo (2016) investigated the influence of migration and birth rate on food security in Akure Metropolis, Ondo State, Nigeria. The researcher adopted ex-post facto design for the study, and purposive and simple random sampling techniques to select a population of 988 health workers and a sample of 588 respondents respectively from the area of study.

Questionnaire was the main instrument for data collection and Pearson product moment correlation as the statistical analysis tool. The result of the investigation showed that high birth rate significantly influences food security, and therefore recommended, among others, that birth control stakeholders and government should carry out adequate awareness campaigns to tame the incessant proliferation of children by families.

In the same vein, Olatunji (2018) conducted a study on birth control and carrying capacity of agricultural produce in the south west: A case of Igbara-Oke in Ondo State, Nigeria. Descriptive survey design was adopted for the study, using simple random sampling technique to select and administer questionnaire to a sample of 456 respondents drawn from a population of 988 market women from the area of study. One-way analysis of variance (ANOVA) was the statistical tool adopted for data analysis. From the findings, it was revealed that the higher the birth rate, the less the carrying capacity of agricultural produce. The researcher recommended, among others, that citizens should be concertize by government and non-governmental organisations (NGOs) to adopt birth control and child spacing in families to achieve food security.

From the foregoing, it is revealed that high birth rates reduces food security, while low birth rates enhances food security.

Methodology

Correlational survey research design of trend study approach was adopted for the study. The design was to investigate the prediction of food security from population growth dynamics (birth rate) over the period of seven years, 2015 – 2021. The choice of design is justified on the predictive and trend nature of the study.

The area of this study is Cross River State, which comprised of three Education Zone namely Ogoja, Ikom and Calabar Education Zone. Cross River State is one of the 36 states in Nigeria and geographically it lies between longitude 7 15'E and 9 30'E of the Greenwich meridian and latitude 4 5N and 7N of the Equator and cover a landmass of 21,019 km² (Department of Geography, University of Calabar). Cross River State is located in South-South geopolitical zone, the state is bordered to the North by Benue State, to the South by Bight of Bonny, to the East by Republic of Cameroon and to the West by Akwa-Ibom, Abia and Ebonyi States. The state comprised of eighteen Local Government Areas namely Obanlikwu, Obudu, Bekwara, Yala, Ogoja, Boki, Ikom, Etung, Obubra, Yakurr, Abi, Biase, Akamkpa, Odukpani, Calabar Municipality, Akpabuyo, Calabar South and Bakassi. According to National Population Commission, the population of Cross River State is projected to be 4, 406, 200 (males and females) as at 2022. The area of the study experiences both rainy and dry seasons.
The population of Cross River State relative to population growth dynamics (birth rate) and food security between 2015-2021 constitute the population of the study. This target population is not accessible directly because of lack of accurate data. Again, because the study is a trend study the population is assumed infinite.

The purposive sampling technique was adopted in selecting the population growth dynamics (birth rate) and food security data between 2015-2021. This period of 2015-2021 is justified on the fact that the same government run within this period.

The sample for the study is secondary data of the sub-variables of population growth dynamics (birth rate) and food security of 2015-2021 in Cross River State.

The instrument developed for the study was an inventory to tabulate the record of the needed data from the secondary sources. Two experts in measurement and evaluation ensured the validity of the instrument. The instrument is inventory of Population Growth Dynamics Inventory (PGDI) and Food Security Inventory (FSI)

Analysis of data was carried out base on the research question and hypothesis formulated. The hypothesis under study was re-stated for the variable the statistical tool that was used for analysis is simple linear regression and trend analysis chart.

Description of the Variables

There are two main variables in the study. The variables are Population Growth Dynamics (independent variable) and Food Security (dependent variable) in Cross River State, Nigeria. The sub-variable of the independent variable is birth rate. The three sub-variables of the dependent variable include food production, food availability and food accessibility. Secondary data collected from the ministries of Agriculture and Ministry of Health is presented in table 1.

Result and findings

The findings are presented in accordance with the hypothesis stated. The hypotheses was tested using the data collected on the variable in the study at the.05 level of significance.

Ho:1

Birth rate does not significantly predict food security in terms of food production, availability and accessibility in Cross River State, Nigeria.

Hypothesis one was tested on the secondary data collected using simple linear regression analysis to regress the birth rate on food security in Cross River State, Nigeria. The food security was measured in terms of food production, food availability and food accessibility. In terms of food production, the simple regression analysis yields an R = .92. This interprets that there is a high correlation between birth rate and food production. The R^2 of .844 means keeping other population growth dynamics constant, birth rate will account for about 84.4% of the variance in food production in Cross River State.

Table 1

Data showing the population growth dynamics of birth and food security in terms of food production, availability and accessibility between the years 2015 and 2021

Year	Birth	Food Production	Food Availability	Food Accessibility
2015	41,328	10,046,062	9,041,456	7,233,165
2016	43,211	10,046,059	9,041,453	7,233,162
2017	39,987	10,159,066	9,143,159	7,314,527
2018	40,747	9,834,260	8,850,834	7,080,667
2019	38,628	9,387,330	8,448,597	6,758,878
2020	30,114	6,289,098	5,660,188	4,528,150
2021	37,326	7,436,722	6,693,050	5,354,440

The Analysis of variance (ANOVA) result obtained from the regression table yielded an F-ratio and a p-value which was significant at .05 ($F_{(1,5)} = 27.09$, $P = .000 < .05$). From the coefficient table, the birth rate coefficient was 331.6929 and the intercept was -3829039 indicate a negative direction. This implies that for every unit increase in the birth, there should be a corresponding increase of the food production by 331.6929. The interceptor value indicates that food production will be negative (-3829039) when the birth rate is zero. Therefore, the regression equation for hypothesis one with respect to food production as a component of food security is y = 331.69x -3829039.

The trend analysis presented in figure 1 shows how the food production moves with birth rate between the years 2015 and 2021. From figure 1, a fairly stable birth rate estimate was maintained from 2015 to 2018. Between 2018 and 2019, a little decline in food production was observed while the birth rate remains constant, but between 2019 and 2020, a drastic reduction in food production was observed until the years 2021 which witnessed a relative small increase in food production. This probably was because of the global pandemic of COVID-19. However, the birth rate in these years remains fairly constant. Summarily, it can be seen from the analysis that the birth rate significantly correlates with food security when measured in terms of food production.

Table 2

Regression analysis of birth rate on food production

	Df	SS	MS	F-ratio	p-value
Regression	1	1.20	1.20	27.09	0.003
Residual	5	2.21	4.41		
Total	6	1.42			
	Coefficients	Standard Error		t Stat	P-value
Intercept	-3829039	2483226		-1.54196	0.183722
Birth rate	331.6929	63.73332		5.204387	0.003454

$R = .92$, $R^2 = .844$,

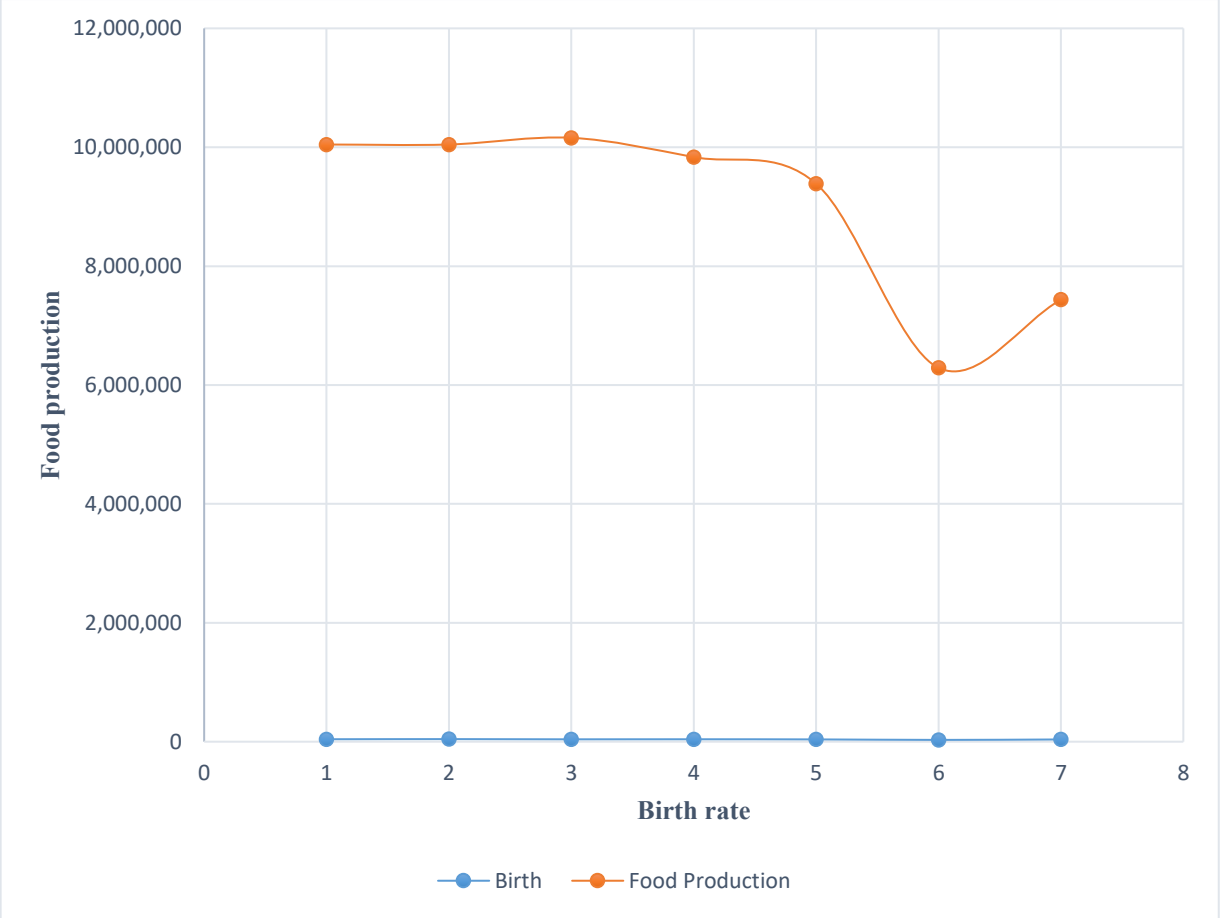

FIG. 1 Trend relationship between birth rate and food production

Similarly, table 3 presents the correlation between food security in terms of food availability and birth rate. The R^2 value of 0.844 indicates that 84.4% of the variance in food production can be explained by birth rate. The ANOVA test showed a significant result with an F-ratio of 27.09 and a p-value of .00, indicating that the relationship between birth rate and food production is statistically significant. The positive coefficients of the birth rate (298.5236) and intercept (-3446136) suggest that an increase in birth rate leads to a negative increase in food availability, all other variables being held constant.

The regression equation, Y=298.52X+-3446136, can be used to predict the impact of changes in birth rate on food availability. For instance, the intercept value (-3446136) shows that food availability will be negative when the birth rate is zero, and the birth rate coefficient value (298.52) implies that every unit increase in birth rate in Cross River State leads to a negative increase in food availability. Figure 2 shows that food availability remained stable from 2015 to 2018, with a slight decline in 2019 before a drastic reduction in 2020, possibly due to the global pandemic of COVID-19. However, food production increased in 2021, while the birth rate remained constant. The analysis demonstrates that birth rate is a significant predictor of food security when measured in terms of food availability.

Table 3
Regression analysis of birth rate on food availability

	Df	SS	MS	F	p-value
Regression	1	9.69	9.69	27.09	.003
Residual	5	1.79	3.58		
Total	6	1.15			

	Coefficients	Standard Error	t Stat	P-value
Intercept	-3446136	2234903	-1.54196	0.183722
Birth rate	298.5236	57.35998	5.204388	0.003454

$R = .92$, $R^2 = .84$, Std Error = 597994.6

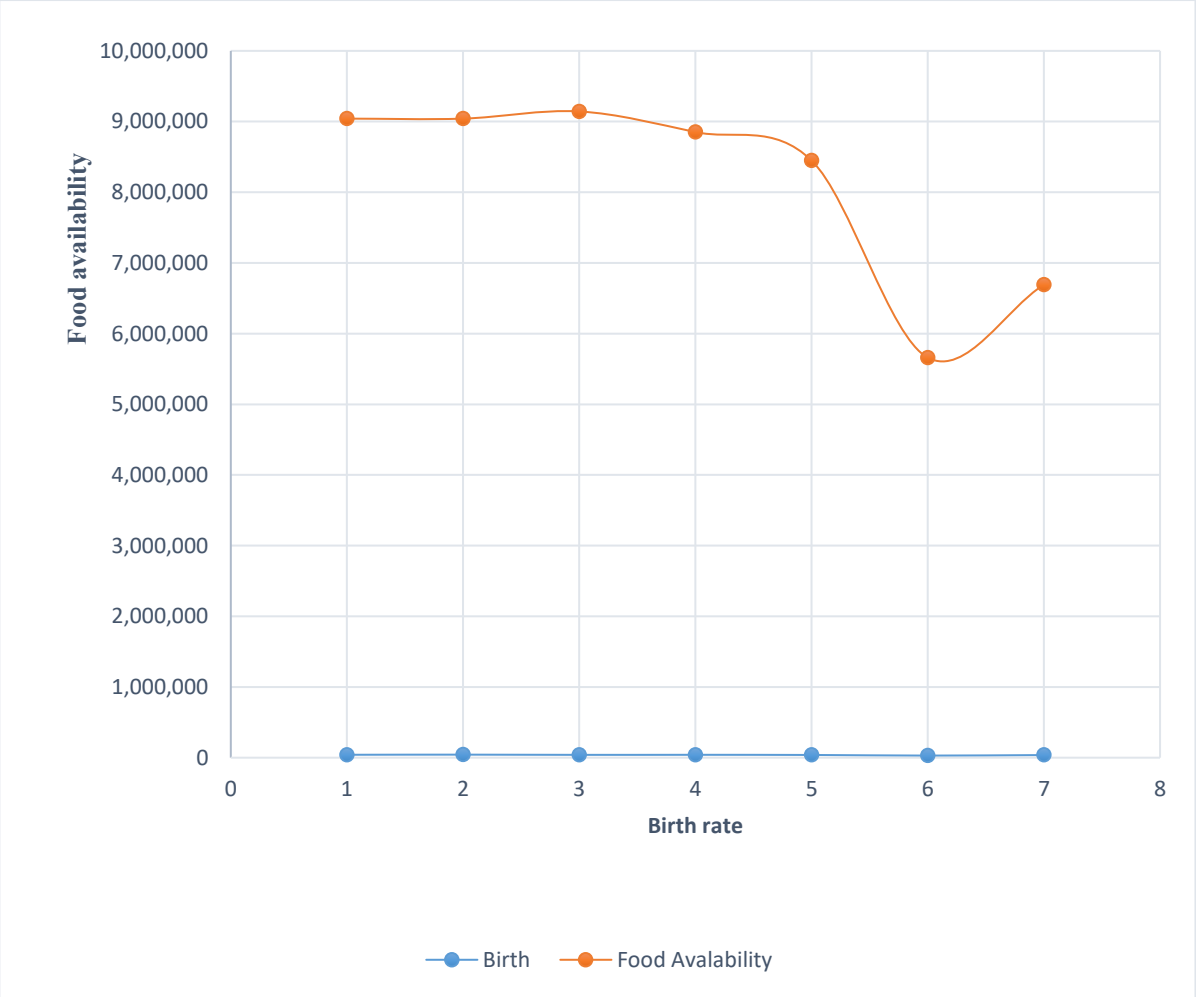

FIG. 2 Trend relationship between birth rate and food availability

The next index of measuring food security in this hypothesis was food accessibility. The R^2 value of .844 indicates that 84.4% of the variability in food accessibility can be explained by the birth rate in the Cross River State. The ANOVA result from the regression table shows a significant F-ratio of 27.09 with a p-value of .00, which is below the alpha level of .05 ($F_{(1,5)}$ = 27.09, P = .000 < .05). The coefficient table reveals a positive direction with a birth rate coefficient of 298.52 and an intercept of -3446136. This means that for every unit increase in the birth rate, food accessibility increases by a negative amount, assuming all other variables remain constant. The coefficient table also shows that when the birth rate is zero, the food accessibility intercept value is -3446136, indicating negative food accessibility. Additionally, the birth rate coefficient value of 298.52 suggests that for every unit increase in birth rate, food production increases by approximately 298.52 units. The regression equation for the hypothesis can be expressed as Y=298.52X+-3446136.

Figure 3 provides a detailed trend analysis of the data. It shows that food accessibility remained stable from 2015 to 2018, but a small decrease was observed in 2019 while the birth rate remained constant. A significant reduction in food accessibility was observed from 2019 to 2020, which was likely caused by the global pandemic. However, there was a relative increase in food accessibility in the years 2021, even though the birth rate remained constant. The analysis suggests that the birth rate significantly correlates with food insecurity when measured in terms of food accessibility.

Conclusively, the results reveal that birth rate is a significant predictor of food security from all the three measures. Specifically, an increase in birth rate leads to a negative increase in food production, availability, and accessibility, if all other variables are kept constant. The trend analysis shows that food security remained stable from 2015 to 2018, with a slight decline in 2019, followed by a drastic reduction in 2020, likely due to the global pandemic of COVID-19. However, there was a relative increase in food security in 2021 but still far below the preceding years. In summary, the analysis demonstrates that the birth rate significantly correlates with food security in Cross River State and hence the hypothesis is rejected.

Table 4
Regression analysis of birth rate on food accessibility

	df	SS	MS	F	p-value
Regression	1	9.69	9.69E+12	27.08565	0.003454
Residual	5	1.79	3.58E+11		
Total	6	1.15			
	Coefficients		Standard Error	t Stat	P-value
Intercept	-3446136		2234903	-1.54196	0.183722
Birth rate	298.5236		57.35998	5.204388	0.003454

$R = .92$, $R^2 = .84$

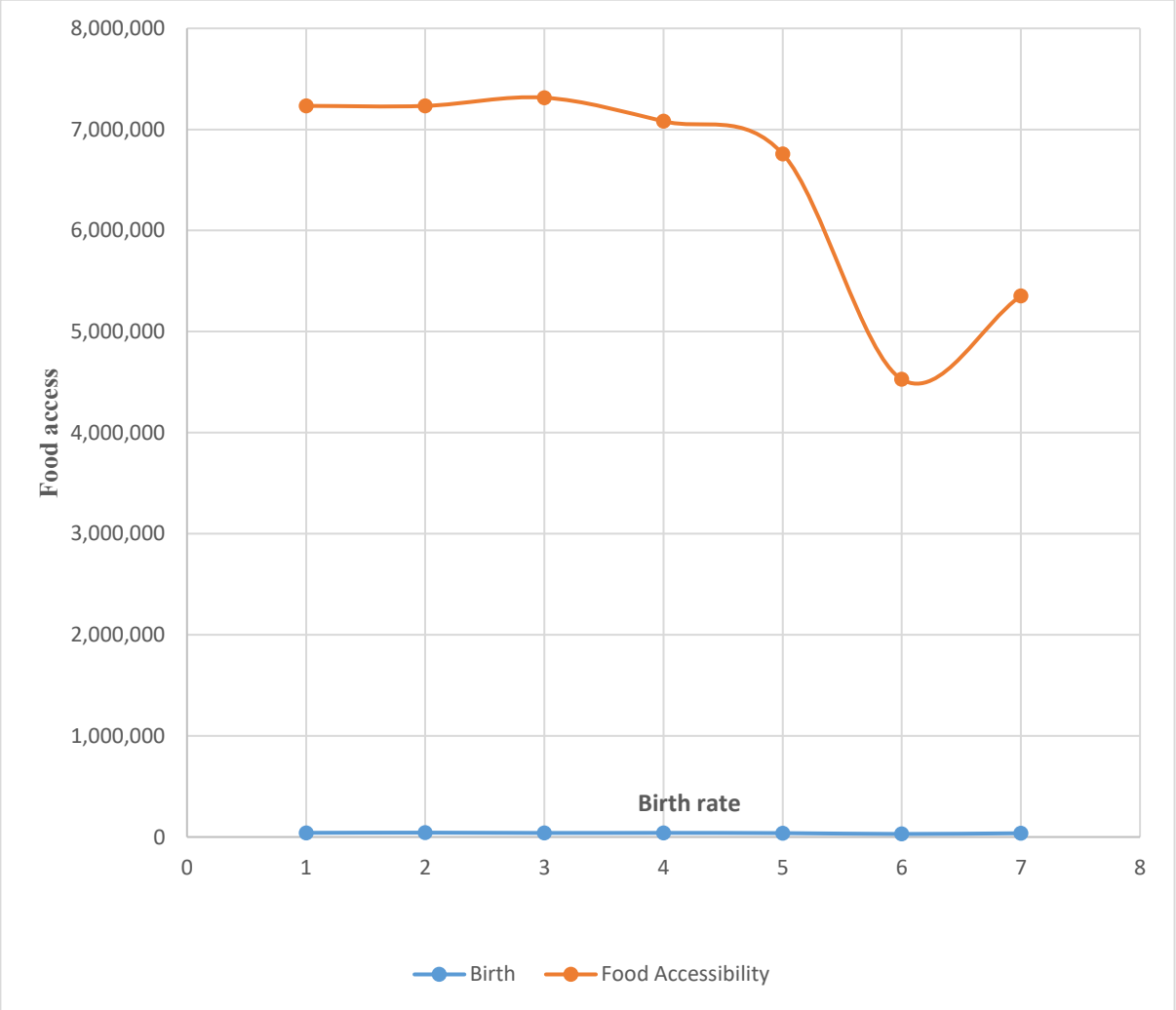

FIG 3: Trend relationship between birth rate and food accessibility

Discussion of findings

Birth rate and food security

The study found that birth rate is a strong predictor of food security ($R2=0.844$, $F=27.09$, $p<.001$), with an increase in birth rate leading to a negative impact on food production, availability and accessibility. The regression equation is $Y=298.52X + -3446136$ for all three measures. Food production was stable from 2015 to 2018, with a decline in 2019 and a drastic reduction in 2020 due to the pandemic. However, there was a relative increase in food production in 2020 and 2021 despite a constant birth rate, and the same trend was observed for food availability and accessibility. Overall, the results demonstrate the significant impact of the birth rate on food security in the Cross River State (see Tables 2-4 and Figures 1-3).

This study finding was in line with the study conducted by other scholars in the field. Ede's (2016) research findings suggest that population growth, as measured by birth rate, has a

significant impact on food security and sustainability. Ndifon (2015) also found that population density, as determined by birth rate, significantly affects food availability and security. In line with these studies, Nuhu's (2018) research discovered that the implementation of birth control policies can improve food security. Nuhu recommended that governments and non-government organizations (NGOs) should conduct regular awareness campaigns and counselling services to encourage citizens to reduce their birth rates.

Similarly, Adebanjo (2016) found that a high birth rate significantly influences food security, and recommended that birth control stakeholders and governments should carry out effective awareness campaigns to reduce the proliferation of children by families. These findings are consistent with Olatunji's (2018) research, which revealed that higher birth rates reduce the carrying capacity of agricultural produce. The collective results of these studies highlight the crucial role of birth rate as a determinant of population growth and its impact on food security and sustainability. It is clear that reducing birth rates can improve food security by reducing the demand for food and allowing for greater agricultural productivity. Therefore, it is essential for governments and NGOs to take proactive measures to promote family planning and reproductive health education to reduce birth rates and ensure long-term food security.

Conclusion

The purpose of the study was to investigate if population growth dynamics predict food security in Cross River State. The sub-variable of the study is birth rate. The study pay attention to addressing the prevalence of food insecurity in Cross River State. Different related literatures to the study were reviewed according to the sub-variable of population growth dynamics and the research methodology was stated and discussed. Based on the findings of the study, it was concluded that birth rate and migration significantly predict food security.

Recommendations

Based on the findings of the study, the following recommendations were made:

i. Government and Non-Governmental Organizations (NGOs) should take proactive measures to promote family planning and reproductive health education to reduce birth rate and ensure long-term food security.
ii. Policy makers and other stakeholders should prioritize the implementation of measures to prevent high birth rate to improve food security.
iii. Government and Non-government organization should conduct regular, awareness campaigns and counselling service to encourage citizens to reduce their birth rate.
iv. Government should formulate policies that will regulate polygamy in order to control over population.

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