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Population and Economic Growth in Nigeria

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ABSTRACT

This study investigates the relationship between population growth and economic growth in Nigeria. It particularly looked at the driving causes of population growth in Nigeria and the causal relationship between population and economic growth in the country from 1990 to 2017. The VAR granger causality analytical techniques used showed that economic growth significantly drives population growth in Nigeria. However, fertility rate and gross secondary enrolment drive population growth on a low significant level in the study while fertility rate was the only variable in the study that causes economic growth. The overall granger causality test indicates that all the variables (POPG, FRATE and EDU) significantly cause GDP to change in the Nigerian economy. One can deduce from the analysis that fertility rate which according to other studies is a major driver of population growth also accounts for economic growth, hence, the number of persons given birth to in Nigeria affects development. However, the direct granger causality of population on economic growth was only significant at a high degree of freedom and p-value. The study further revealed that economic growth significantly causes population growth in Nigeria. This indicates that the economic resources in the country have a way of reflecting on the number of people in the country. From the foregoing, it is obvious that population growth and economic growth in Nigeria exhibits unidirectional granger causality running from economic growth to population growth. More so, fertility rates and gross secondary enrolment (EDU) significantly exhibited bi-directional granger causality. Hence, it is also worth noting that all the variables (POPG, FRATE and GDPG) significantly contributed in causing gross secondary enrolment (EDU) in the country. The study concludes that fertility and secondary education are intermediate variables in the discourse of population and economic growth in Nigeria. The policy direction of education and fertility rate in the country can significantly reveal how population and economic growth relates. Hence, the study recommends that educational and fertility rate policies by all stakeholders should tilt toward ensuring the Nigerian populace achieve demographic dividend instead of demographic disaster.

Keywords: Population, Economic Growth, Population Growth

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INTRODUCTION

In recent times the issue of Nigeria population has become critical to economic development (Eli, Mohammed and Amade, 2015). According to the UN report of 2017, the world population is 7.6 billion and expected to reach 9.8 billion in 2050. Top of the list are China with 1.4 billion, India with 1.3 billion. Out of the top ten largest countries worldwide, the population of Nigeria is the most rapidly growing at a rate about 2.6% making it the 7th most populated country in the world. Hence, Nigeria's population is projected to be the third largest by 2050 surpassing the population of the United States. The dynamic causes of population growth in the Nigeria demographic structure has generated many debates among which this thesis is expected to contribute by assessing the relationship between population growth and economic from the Nigerian experience (UN, 2017).

Population is a natural endowment of human resources. Nigeria's population has been tied to several economic indicators like in other countries but the case of Nigeria is different as the huge population (of about 200 million in 2019) denominator has significant effects on Nigeria macroeconomic variables such as GDP per capita and education among others. However, different schools of thought have emerged from time about the effect of population on economic growth. Proponents posit that human resources amounts to human capital germane for economic development (Ekperiware, 2016). Opponents of population growth are of the view that population growth impedes economic growth (Theodore, 2006 and Iwejingi 2011).

Precisely, Jhingan (2005) posits in his book that population growth is unfavourable to GDP per capita especially for highly populated countries with unequal income distribution. Another set of scholars hold the opinion that population does not matter when it comes to economic growth (Bloom and Freeman, 1986, Aidi, Emecheta and Ngwudiobu, 2017). These scholars called population neutralists or the revisionist perspective, holds that population growth is not a significant factor in the economic growth process. They suggest that it is the knowledge humans possess (human capital) that causes economic growth especially in this technologically advanced world. The critical concern in this thesis is what variables drive population growth and what is the causal relationship between population and economic output in Nigeria?

Objectives of the Study

The general objective of this study is to examine the relationship between population growth and economic growth in the Nigerian economy. The specific objectives are to identify the drivers of Nigerian population growth in the Nigerian economy; and examine the causal relationship between population growth and economic growth in Nigeria.

Research Questions

The research questions raised in this study are as follows: What economic variables are responsible in driving population growth in Nigeria; and What is the causal relationship between population growth and economic growth in the Nigerian economy?

Population Growth and Economic Development

As pointed out by Ekperiware and Tenny (2017) and United Nations Report (2019), population is an important concept of economic development. Several studies have looked at the effect of population growth in Nigeria. Some of these studies are reviewedhere. Three theories have pointed out how population relates to economic development; the Malthus theory of population called the pessimist's theory asserts that population grows geometrically while food supply grows arithmetically which is anti-growth. This posits that population has a constant tendency to outrun food supply (economic output) (Malthus, 1826). This population theory is further illustrated with a graph below which shows how overtime, population will be more than economic output and causes vices and misery to society. This theory based on agrarian society is faced with technology reality where more economic output can be realized (Hirschman, 2004).

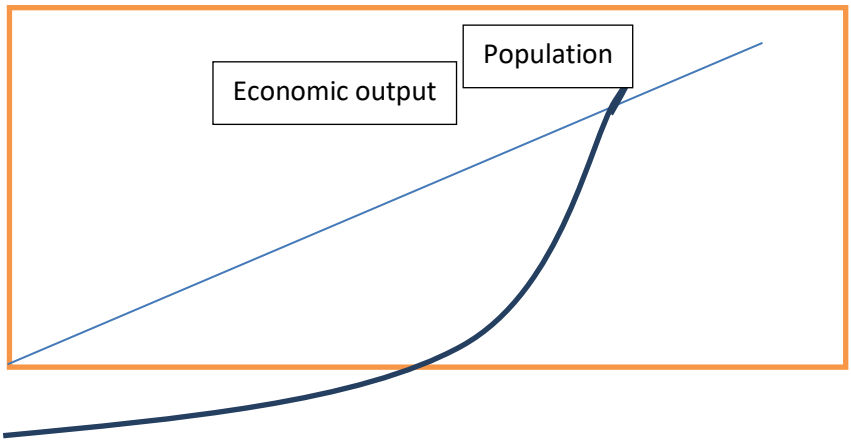

Figure 1: Trend of Population and Economic Resources (Source: Malthus, 1826)

The optimum theory of population is another population theory that measures population size and available production of wealth. Here, it is income per head that is measured. Hence, a reduction of population size will lead to increase in per capita income while an increase in population will lead to a reduction in per capita income. However, this theory asserts an optimum population will result in the maximum income in a society as shown below.

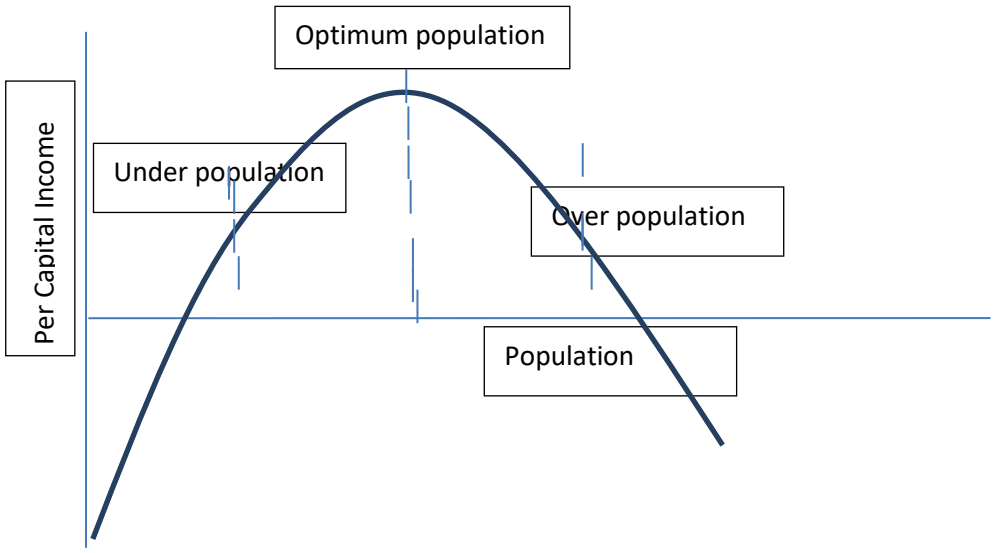

Figure 2: Optimum Theory of Population (Source: Author's construct, 2019)

The theory of demographic transition refers to the three stages population growth passes through in any society. From figure 2, in the first stage, there is high birth rate and death rate but the growth rate of population is low. In the case of the second stage, the birth rate remains stable while the death rate falls. This leads to high population. The third stage, the birth rate tends to fall and equals the death rate leading to low population growth in such a society. Figure 3 is a pictorial of the foregoing analysis. All these demographics have effect on economic development (Ekperiware and Tenny, 2017).

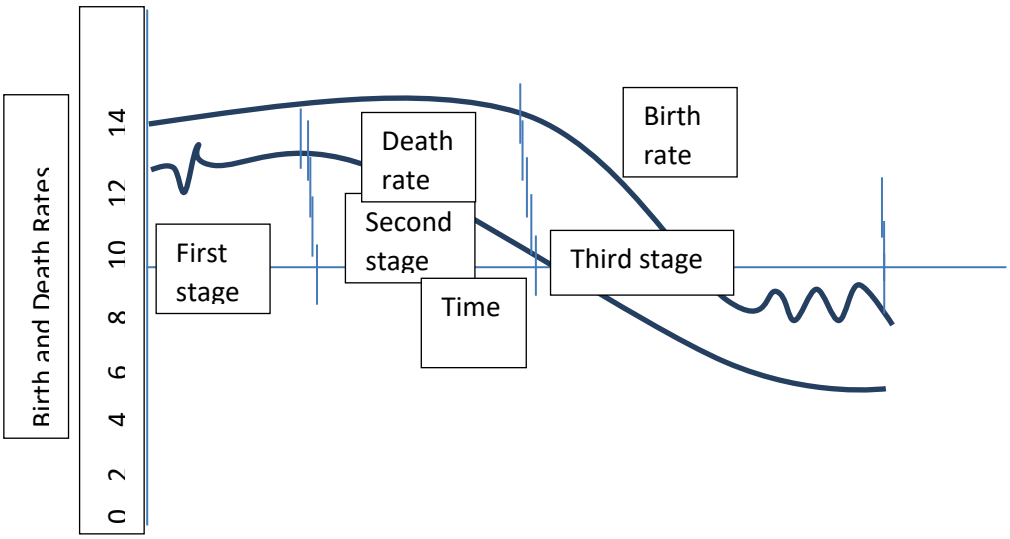

Figure 3: The Theory of Demographic Transition (Source: Author's construct, 2019)

A sum from the theoretical discuss, each of the sequential theories discussed is an improved thematic and all exhibit how population relates with the economic development of society. From the Malthus theory of population and food supply in relation with the optimum theory of population, population essentially relates with economic growth. Hence, an empirical review of population and economic growth is further looked at.

Ogunleye, Owolabi and Mubarak (2018) considered the effect of population growth rate, fertility rate, and crude death rate on economic growth in Nigeria from 1981 to 2015 using the ordinary least square regression analysis. The study indicated that population growth rate in the country positively affects economic growth significantly. However, they found fertility rate to be affect economic growth negatively. This shows that the number of children per woman is impeding economic growth. This maybe because of the number of children per woman can reduce the working hours of mothers in the country which the study did not consider.

Adewole (2012) examined the Malthusian theory of population on economic development in Nigeria with data from 1981 to 2007. The study found real Gross Domestic Product, population growth and per capita income stationary at first difference. The findings further showed that population growth positively impacts on real gross domestic product and Per Capita Income in Nigeria.

Gao and Shao (2016) examine population effect on local provinces using the economic convergence theory to establish a theoretical model in selecting a panel data in eight minority provinces from 1992 to 2012. The result revealed a significant and positive correlation among investment, human capital, the growth rate of labor and per capita GDP growth. The study also found a significant and negative correlation between children's dependency ratio and per capita GDP growth. This indicates that in China, investment in human capital improves per capita income of the people and as expected, reducing the dependency ratio increased the per capita income levels in these provinces.

Schramm (2011) studied the One-Child-Policy in China from 1979 to 2005 using critical model analysis with the Solow model through different population development scenarios of low, middle and high growth rates. The results indicated that the One-Child-Policy influenced the China's economic development in the periods and will continue to affect its future. Precisely, the policy from the study is turning the impact from a positive one to a negative one in the China economy.

Eli, Mohammed and Amade (2015) further used descriptive and regression analysis to examine the impact of population growth in Nigeria from 1980 to 2010. The findings revealed a positive

relationship between economic growth and population but a negative relationship was found between economic growth and life expectancy in the study. The studies so far from Nigeria have held that the Nigerian population positively affects economic growth. It might be germane to investigate the relationship between population and economic growth.

Nwosu, Dike and Okwara (2014) investigated the relationship between population growth and economic growth in Nigeria in a linear model from 1960 to 2008. They made use of the Augmented Dickey-Fuller (ADF) stationarity test, Granger Causality and Co-integration tests. The study revealed that population growth has a significant impact on economic growth with a sustainable long-run equilibrium relationship. They also found evidence of unidirectional causality from population growth to economic growth.

In Kenya according to Thuku, Paul and Almadi (2013), there is bi-directional Granger causality between population growth and economic growth.The study also revealed a long-run relationship between population and economic growth besides supporting the hypothesis that population is driving economic growth in the country.

Furthermore, Aidi, Emecheta and Ngwudiobu (2017) examined the causal relationship between population growth and economic growth in Nigeria with annual time series data from 1970 to 2013. From the adopted Granger-Causality technique, the result indicate that population growth did not cause economic growth in Nigeria during the period of the study. The study further showed that economic growth also is not a cause of the population growth in the country. The study however, recommended government investment in education for human capital development in the country.

Similarly, Dominic, Oluwatoyin and Fagbeminiyi (2016) examined the factors driving population growth in the Nigeria economy using the Johansen co-integration econometric technique. The findings revealed a long-run relationship between infant mortality and maternal mortality rates influencing population growth in Nigeria.

Theodore (2006) examined the environmental effect of Nigeria's population. The study revealed that the effects of population growth in Nigeria is mostly on the living standards, energy consumption, carbon emissions, air pollution, human congestion, resource use and environment degradation on the Nigerian landscape. They predicted the landscape will not be able to sustain the increase in population for a very long period of time if nothing is done to checkmate the rapid population growth.

Pimentel, Huang, Cordova and Pimentel (1997) showed that world population grows geometrically. They also illustrated that pressure is being placed on arable land, water, energy, and biological resources in providing adequate supply of food, which is a challenge to sustainable development. The number of malnourished has increased globally, indicating a combination of insufficient food, low incomes, and inadequate distribution of food especially in China which has a large population.

Looking into the Africa scenario, Hall, Dawson, Macdiarmid, Matthews, and Smith, (2016) revealed that because of the huge population in Africa, an estimated one in four people still lack adequate food for a healthy life. They examined the potential impact of population growth and climate change on food security in Africa up to the year 2050. They used a modelling framework termed FEEDME (Food Estimation and Export for Diet and Malnutrition Evaluation) in estimating the impact of future climate changes. They made use of IPCC Special Report on Emissions Scenarios projections and projected population growth on food availability and subsequent projected undernourishment prevalence in 44 African countries. The findings from the study showed that rapid population growth will be the leading cause of change in food insecurity and widespread undernourishment in Africa.

Further investigating the effect of population growth in Nigeria with respect to food security, Abdulrahaman (2013) examined the level of population growth and agricultural commodity output in Nigeria. The study used secondary annual time series data with linear regression model analysis. The findings revealed and rejected a null hypothesis of there being no significant effect between population growth and food security in Nigeria. This indicates that the Nigerian population significantly accounts for food insecurity in Nigeria.

Summary and Gap in the Literature Reviewed

The theoretical and empirical review revealed a thematic idealization of how population evolves in society. It was revealed that population in most of the studies is additive to economic growth. However, population has constituted a challenge to environmental protection, safe living and food security in some of the studies. The problem population increase has on development was mostly noticed in populated areas with not much investment in education. From the reviewed literature, a consistent gap noticed is the fact that it is difficult to establish how population growth itself affects economic growth negatively, except for Abdulrahaman (2013) who captured how population growth accounts for food insecurity in Nigeria. Nevertheless, population growth accounts for pollution, Greenhouse Gas emission, food security and pressure on government infrastructure among others. Hence, population growth can affect an economy other than just economic growth (output from that economy) but measures to estimating how population growth affects sustainable development of an economy are not substantial.

RESEARCH METHODOLOGY

This study investigates the casual relationship between population and economic growth in Nigeria. It particularly looked at the drivers of population growth in Nigeria and the causal relationship between population and economic growth in Nigerian from 1990 to 2017. The literature is replete with work done in population and economic growth (both in theories and empirical studies). Crucial variables that have the potential of causing either population as well as economic development are change in fertility rate, economic growth rate, population growth rate and education. The choice of these variables is essentially because they may have some transmission or interactive causal nature. The sources of the variables for this study are from the World Development Indicators' database of 2019. A crucial component of research design of such is a model that can measure feedback besides interactions. This is where the auto regression model comes handy. A schematic of the aforementioned idea research design is described in the following sub-sections

Discussion of the Essential Variables for the Study

The variables considered in investigating the causal relationship between population and economic growth are; fertility rate, economic growth rate, population growth rate and education. A discussion of each of these variables is germane to know their theoretical relations besides their definitions.

Fertility Rate is the expected number of children to be born per woman (or per 1,000 women) if they were to pass through the childbearing years bearing children according to a current schedule of age-specific fertility rates. This is directly related to the population growth of an economy.

Economic Growth Rate is the change in goods and services produced in a given economy over a period of time, usually a year. Such changes reflect effect of policies and economic progress from other economic indicators like education, population and even fertility rate as the case may be in Nigeria.

Population Growth Rate has to do with the rate of change in the number of people in a given locality (Nigeria as the case may be) over a given period of time usually a year. Among other variables, birth and death rate as well as education and economic conditions are crucial factors that may drive population growth rate. A investigation into this study would contribute to the discussion.

Education has to do with making human resources (population) more useful in an economy. It is the act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life.

Type, Sources and Measurement of Data

The table below presents the type, sources and measurement of the data used to represent each variable in the study.

Table 3.1: Sources and Measurement of Data

S/N	VARIABLE	TYPE	SOURCE
1	Population Growth rate	Secondary time series data	WDI database 2019
2	Fertility rate	Secondary time series data	WDI database 2019
3	Economic growth rate	Secondary time series data	WDI database 2019
4	Education	Secondary time series data	WDI database 2019

Model Specifications

This empirical study is designed to examine the effect of population growth on economic growth in Nigeria from 1999 to 2017. The study adopts the optimum population theory as the basis for the study in that the theory is all about the size of population of the country in relation to the resources of the country at a particular time. Expressing how population growth and other related variables like fertility rate and education interrelates with economic growth. This study establishes the vector auto regression (VAR) model as thus;

$$\text{VAR (j)}\quad Y_t = \alpha + \phi_1 Y_{t-1} + \ldots + \phi_j Y_{t-j} + \varepsilon_t \quad (3.1)$$

Where Y_t is a 4x1 vector of endogenous variables, α is a 4x1 vector of intercepts, Y_{t-j} is a vector of lagged variables (exogenous per time in the study), while ε_t is the disturbance terms, and ϕ is a 4x4 matrix of coefficients. The VAR model shows auto-regressive model that allows dynamic relationship than the normal static Ordinary Least Square (OLS) estimation. From equation 3.1, a matrix form can be deduced to derive the standard VAR representation with the defined symbols as follows:

$$\text{VAR(1)}\begin{bmatrix} POPG_t \\ FRATE_t \\ EDU_t \\ GDPN_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \end{bmatrix} + \begin{bmatrix} \phi_{11} & \phi_{12} & \phi_{13} & \phi_{14} \\ \phi_{21} & \phi_{22} & \phi_{23} & \phi_{24} \\ \phi_{31} & \phi_{32} & \phi_{33} & \phi_{34} \\ \phi_{41} & \phi_{42} & \phi_{43} & \phi_{44} \end{bmatrix} \begin{bmatrix} POPG_{t-1} \\ FRATE_{t-1} \\ EDU_{t-1} \\ GDPN_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix} \quad (3.2)$$

Equation 3.2 can be expressed in linear form as thus:

$$VAR_{(p)} \approx \overleftrightarrow{Y_t} = \alpha + \overleftrightarrow{\phi_1} Y_{t-1} + \overleftrightarrow{\phi_2} Y_{t-2} + \ldots + \overleftrightarrow{\phi_p} Y_{t-p} \quad (3.3)$$

Where *p* represents the number of lagged periods which is determined through the popular criteria on lag length criteria selection test and *Y* the variables used in the model (as equation 3.2) as thus:

From the VAR technique from equation 3.3 with the data set from 1990 to 2017, p is equal to lag length three (p=3). Testing for unit roots and lag length criteria are carried out to avoid spurious estimates (Sims, 1980; Gujarati and Sangeetha, 2007). A crucial assumption in using VAR is that the variables have to be stationary at levels. From appendix 1, the variables are stationary at level except education that was stationary after first difference with lag length three as appropriate.

Analytical Techniques

To analyse the causal effect mainly among education (EDU), population growth (POPG), fertility rate (FRATE) and economic growth (GDPG), the Multivariate Granger Causality (MGC) model specification was employed. In the parlance of Granger causality, there are three possible causality hypotheses: unidirectional, bidirectional/multidirectional, and independent. For unidirectional, the past values of one variable predicts the current values of the other variable(s). For bidirectional, there is a feedback prediction from both or among the variables. In independent, neither unidirectional nor bidirectional

possibilities hold (Gujarati and Sangeetha, 2007:711). The multivariate granger causality framework is specified as follow:

$$GDPG_t = \sum_{j=1}^{n} \theta_j GDPG_{t-j} + \sum_{i=1}^{n} \varphi_i EDU_{t-i} + \sum_{p=1}^{n} \lambda_p FRATE_{t-p} + \sum_{\hbar=1}^{n} \nabla_{\hbar} POPG_{t-\hbar} + u_{1t} \quad (3.4)$$

$$EDU_t = \sum_{j=1}^{n} \beta_j GDPG_{t-j} + \sum_{i=1}^{n} \delta_i EDU_{t-i} + \sum_{p=1}^{n} \ell_p FRATE_{t-p} + \sum_{\hbar=1}^{n} \wp_{\hbar} POPG_{t-\hbar} + u_{2t} \quad (3.5)$$

$$FRATE_t = \sum_{j=1}^{n} \varpi_j GDPG_{t-j} + \sum_{i=1}^{n} \pi_i EDU_{t-i} + \sum_{p=1}^{n} \mu_p FRATE_{t-p} + \sum_{\hbar=1}^{n} \int_{\hbar} POPG_{t-\hbar} + u_{3t} \quad (3.6)$$

$$POPG_t = \sum_{j=1}^{n} \notin_j GDPG_{t-j} + \sum_{i=1}^{n} \eta_i EDU_{t-i} + \sum_{p=1}^{n} \xi_p FRATE_{t-p} + \sum_{\hbar=1}^{n} \iota_{\hbar} POPG_{t-\hbar} + u_{4t} \quad (3.7)$$

Where the error terms ($u_{1t}, u_{2t}, u_{3t}, u_{4t}$) are assumed uncorrelated, equation 3.4, 3.5, 3.6 and 3.7 specification are to test whether the information relevant in the prediction of the respective dependent variables per time; EDU, FRATE, POPG and GDPG are contained solely in the time series data of these variables. $FRATE_t$ denotes fertility rate at time t while $FRATE_{t-p}$ is the lagged value of fertility rate, EDU_t denotes gross % of secondary school enrolment at time t while EDU_{t-i} is the lagged value of gross secondary school enrolment, $POPG_t$ denotes population growth at time t while $POPG_{t-i}$ is the lagged value of population growth rate, and $GDPG_t$ denotes economic growth rate at time t while $GDPG_{t-j}$ is the lagged value of economic growth rate. Causality runs from the independent variables when the coefficients of the lagged independent variables are statistically different from zero in each respective equation (3.4, 3.5, 3.6 and 3.7).Results from the MGC analytical technique would reveal variables that cause population and economic growth in Nigeria.

RESULTS AND DISCUSSIONS

Here, the result from the research methodology is presented and analyzed based on the stated research objectives in section two above.

The VAR granger causality test from table 4.1 showed that fertility rate was the only individual variable that granger causes economic growth. This means that fertility rate of women in Nigeria have ingredients that causes economic growth to change. However, the overall granger causality indicates that all the variables (POPG, FRATE and EDU) significantly granger causes GDPG to change in the Nigerian economy. However, the direct granger causality of population on economic growth was only significant at a high rate degree of freedom and p-value. Further from table 4.1 revealed that economic growth significantly granger causes population growth in Nigeria. This indicates that the economic resources in the country have a way of reflecting on the number of people in the country.

Moreso, fertility rate and gross secondary enrolment (EDU) significantly exhibited bi-directional granger causality. It is also worth noting that all the variables (POPG, FRATE and GDPG) significantly contributed in causing gross secondary enrolment (EDU) in the country. The analysis so far shows that fertility rate and education and core intermediate variables in discussing population growth and economic growth in the populous Nigerian economy.

A discussion of the result presented in table 4.1 reveal that fertility rate and education of the population are two essential components of not only population growth but on economic growth as well. The granger causality test reveals that fertility is an essential variable in determining economic growth and the potential number of children a woman in a country have is central to the population size of such an economy. Hence, one can deduce from the analysis that fertility rate which according to other studies is a major driver of population growth (Ogunleye, Owolabi and Mubarak, 2018) and hence number of persons given birth to in Nigeria affects development.

Table 4.1: VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: GDPG			
Excluded	**Chi-sq**	**df**	**Prob.**
EDU	1.572589	3	0.6656
FRATE	7.617044	3	0.0546
POPG	0.257486	3	0.9678
All	20.73409	9	0.0139
Dependent variable: EDU			
Excluded	**Chi-sq**	**df**	**Prob.**
GDPG	9.277111	3	0.0258
FRATE	13.59494	3	0.0035
POPG	8.264542	3	0.0408
All	32.07058	9	0.0002
Dependent variable: FRATE			
Excluded	**Chi-sq**	**df**	**Prob.**
GDPG	1.107092	3	0.7754
EDU	16.42721	3	0.0009
POPG	2.22098	3	0.5278
All	38.31966	9	0
Dependent variable: POPG			
Excluded	**Chi-sq**	**df**	**Prob.**
GDPG	12.54197	3	0.0057
EDU	1.557212	3	0.6691
FRATE	4.717972	3	0.1937
All	26.08723	9	0.002

The relationship between population and economic growth in Nigeria is an indication that economic growth is a variable determining the country's population. From the foregoing, it is obvious that population growth and economic growth in Nigeria exhibits unidirectional granger causality running from economic growth to population growth. Logically, it indicates that there is a transmission mechanism from fertility rate. The high potential number of children from a woman which is 5.67 in 2017 from WDI data base must have been as a result of conducive natural endowment environment for child upbringing. More so, the findings from the granger causality test indicate that fertility rate causes population growth but only at almost 20% level of significance, which is not too impressive statistically.

Surprising from the findings is that school enrolment is a significant component of fertility rate in the country. Although, the potential number of children per woman dropped slightly, the nature of causality is topical for us to determine whether it is a positive or negative relationship. But school enrolment is supposed to reduce fertility rate in a populated country like Nigeria. This is because policies would have been in place by now to finding a way of equipping the population with requisite education to make them more useful in the production process which will lead to demographic dividend rather than demographic disaster. A demographic disaster may likely be the Nigerian case if school enrolment positively increases fertility rate in the country.

CONCLUSION

The causality analysis from the study revealed that fertility rate causes economic growth. Economic growth significantly causes population growth in Nigeria, thereby exhibiting unidirectional granger causality running from economic growth to population growth. Fertility rate and gross secondary enrolment (EDU) significantly exhibited bi-directional granger causality while all the variables (POPG, FRATE and GDPG) significantly accounts for gross secondary enrolment (EDU) in the country. The conclusion from the analysis is that economic growth contributes to Nigeria population growth and the number of children each woman can potentially have in Nigeria contributes to the kind of economic growth Nigeria can have. The study also concludes that fertility and secondary education are intermediate variables in the discussion on population and economic growth in Nigeria.

The policy direction of education and fertility rate in the country can significantly reveal how population and economic growth relate. Hence, the study recommends that educational and fertility rate policies through all stakeholders such as the family, government, NGOs, international bodies and religious bodies should tilt toward ensuring the Nigerian population achieve demographic dividend than demographic disaster.

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Appendix 1: 2019 World Development Indicators' Data of Nigeria Population Growth Rate, GDP Growth Rate, Fertility Rate and Gross School Enrolment

	POPG	**GDPG**	**FRATE**	**EDU**
1990	2.58	11.78	6.49	24.71
1991	2.55	0.36	6.44	25.62
1992	2.52	4.63	6.40	24.86
1993	2.50	-2.04	6.35	25.07
1994	2.49	-1.81	6.30	25.18
1995	2.49	-0.07	6.26	25.04
1996	2.49	4.20	6.22	25.10
1997	2.49	2.94	6.19	25.11
1998	2.49	2.58	6.16	25.08
1999	2.50	0.58	6.13	23.54
2000	2.50	5.02	6.11	24.59
2001	2.51	5.92	6.08	27.02
2002	2.52	15.33	6.06	29.59
2003	2.54	7.35	6.04	27.07
2004	2.56	9.25	6.01	34.98
2005	2.59	6.44	5.99	34.94
2006	2.61	6.06	5.96	34.44
2007	2.63	6.59	5.93	31.85
2008	2.65	6.76	5.90	35.37
2009	2.66	8.04	5.87	39.21
2010	2.67	8.01	5.84	44.20
2011	2.67	5.31	5.80	45.54
2012	2.68	4.23	5.76	47.16
2013	2.67	6.67	5.71	56.18
2014	2.66	6.31	5.65	45.60
2015	2.64	2.65	5.59	46.76
2016	2.62	-1.62	5.53	41.98
2017	2.60	0.81	5.67	44.78

Source: WDI, 2019

Appendix 2: Augmented Dickey Fuller Unit Root Test Results

Variable	Level					First Difference					Result
	Coefficient	t-statistics	5%critical value	0.10%	P valve	Coefficient	t-statistics	5%critical	0.10%	P value	Order of Integration
EDU	-0.40	-2.53	-3.59	-3.22	0.31	-1.31	-6.60	-3.60	-3.23	0.00	I(1)
POPG	-0.16	-4.28	-3.05	-2.66	0.00	-0.10	-1.50	-3.03	-2.65	0.51	I(0)
GDPG	-0.57	-3.32	-2.97	-2.63	0.02	-1.36	-8.54	-2.98	-2.63	0.00	I(0)
FRATE	-0.16	-3.33	-2.99	-2.63	0.02	-1.90	-2.61	-2.99	-2.63	0.10	I(0)

Source: Author's computation (2019)