The International Journal Of Engineering And Science (IJES)
|| Volume || 3 || Issue || 11 || Pages || 07-18 || 2014 ||
ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805

The Effects of Population Growth on Economic Growth in Nigeria

[1]Nwosu, C., [2]Dike, A. O and [3]Okwara, K. K.
[1]*Department of Statistics, Federal University of Agriculture, Makurdi. Benue State, Nigeria.*
[2]*Department of Maths/Statistics,*
[3]*Department of Computer Science,*
Akanu Ibiam Federal Polytechnic, Unwana. Ebonyi State, Nigeria.

----------ABSTRACT----------

This study investigated the time series role of population growth on economic growth in Nigeria and how economic growth is effected through population growth. This study this extends the literature by employing a linear model to analyze economic growth fluctuations vis a vis population growth. The study employed annual secondary observation from 1960 to 2008. The empirical results were based on Augmented Dickey-Fuller (ADF) stationarity test combined with Granger Causality and Cointegration tests. Empirical results support that population growth has a significant impact on economic growth. The study also found that there is a sustainable long run equilibrium relationship between economic growth and population growth. There is also the evidence of unidirectional causality between population growth and economic growth. Policy implications of the study are provided.

Date of Submission: 16 August 2014 Date of Accepted: 10 November 2014

I. INTRODUCTION

Over the years, it has become established that the existence of an efficient and effective human capital is the key to economic growth and development in any nation. This stems from the fact that every other facility and resource required for economic growth is driven by the availability of human capital. More so, in the absence of effective human capital development, an increasing population can have adverse negative effect on the economic growth of a nation. This is because a lot more resources are taken out to manage and cater for the teeming population that the same can generate Brand (2009).It is therefore correct to state that the economic growth of a nation is significantly dependent on the growth of its population. The effect or impact can be either negative or positive dependent on the existence of certain factors and conditions, when studied and understood can be managed or controlled to ensure continuous and sustainable economic growth and development. Dennis (2004), Nigeria is one of the fastest growing countries in the world. With an estimated population of 140 million and an annual population growth rate of 2.9% (NPC 2006), Nigeria is the most populous nation in sub-sahara Africa and the tenth most populous in the world. However, the composition of this population is mainly in the youthful category with 49% being youths below the age of 21 and a dependency ratio estimated at 89%.
A large proportion of this population favours and is living in the rapidly expanding urban area, presently estimated at over 45.2% and will likely hit 55.4% mark by the year 2015 (UNDP, 2007).

With this statistics however, the population growth shows profound inequities and disproportions when analyzed with development indicators such as: 21 doctors per 100,000 people, infant mortality rate of 112 per 1000 live births, maternal mortality of over 980 per 100,000 live births, life expectancy at birth projected at 50 years.We can now define population growth as the increase in the number of human inhabitants of a given place. The total population of any area of the earth's surface represents a balance between two forces. One is natural change caused by the difference between the number of births and deaths. If births are more numerous than deaths in any period, the total population will increase. However, if they are less numerous it will decrease. This simple relationship is modified by a second force; migration. When immigrants are more numerous than emigrants, there will be a population increase. (We assume, of course, that we are ignoring natural change for the moment). When emigrants are more numerous, there will be a population decline. Ben, (2005).Net changes in population totals are caused by the interaction of four elements: Births and immigrants tend to push the total up: Deaths and emigrants tend to bring the total down. Although migration may be the most important factor in small areas (for example, in a small village or a city block), it is less significant on the national level.

For the world as a whole, migration is irrelevant because all movements take place within the limits of the recording area.However, overpopulation is described as a condition where people's numbers exceed the carrying capacity of its habitat. In common parlance, the term usually refers to the relationship between the human population and its environment, the earth. Overpopulation does not depend only on the size or density of the population, but on the ratio of population of available sustainable resources. It also depends on the way resources are used and distributed throughout the population. Andrew, (2001).Matching population growth with development is the real object of global and country action towards improved welfare, human development and economic growth. The changing patterns in the size, structure and distribution of population provide useful leads into the persistent shifts in the choice of approaches for managing development Rostow (1998).

II. STATEMENT OF THE PROBLEM

Much of contemporary economics on population problems have centered on what could be the optimum size and its impact on economic growth and development (Caldwell, 1990; National Research Council, 1993; Onokerhoraye, 1995; Bon goarts, 1996; United Nations 1999; FAO, 2000; UNDP, 2001 and Onwuka 2003). This line of thought originated from the question posed by Malthus (1803) as to whether food production could keep pace with the demand of a growing population and his answer that the power of population is indefinitely greater than the resources on earth to provide the needed subsistence for mankind. The debate triggered by the Malthusian hypothesis points to a lack of universal applicability of his paradigm because in industrialized countries, technological advances have spurred increases in agricultural production which ensures food security for the citizens.

According to statistics from Central Bank of Nigeria (CBN), the gross domestic product (GDP) computed at 1984 factor cost for the period 1970-71 stood at N54, 148.9, it grew steadily between 1972-73 and 1979. By 1980, the GDP had risen to N96, 186.6. However, it plummeted from the 1981 figure of N70,395.9 to N77, 752.5 in 1988 then the economy recovered marginally. The GDP stood at N113, 000 in 1998 with an annual average rates of growth of GDP of 2.1% (percent) little wonder why the economy has not been able to cope with the teeming population explosion. This can be seen from available statistics on per capital income. Again, the world research institute (WRI) estimated the percentage change of Nigerian's capital income for the 1990's to be minus 75.4. Similarly, agriculture became severely difficult by the teeming population growth. For example, the percentage change of the total cropland (000 per hectare) between the last 10 years was minus 21.3. This fact that this percentage field to livestock per capital (0.13) war lower than percentage changes of cereal production within the same period indicates that environmental resources was under stress (Mantu, 2001).The actual articulation and implementation in any economy population programme would not be possible without a determination and serious commitment in the part of the government. Neither can it be realized without putting in place a comprehensive and long perspective planning machinery informed by rich and reliable database. Obviously, we cannot hope to come close to realizing the dream of a sustainable development with the present economic thrust, which places misguided confidence on a deformed and parasitic private sector as the prime mover of the economy and engine of growth (Mantus: 2001). A large body of demographic literature documents the incidence of population growth in Nigeria (see, for example, Olusanya and Pursell, 1981; Farooq, 1985 National population commission, 2002, and federal Republic of Nigeria, 2004a). Ordinarily this growth of population could be to the advantage of a country in terms of the sheer size of its domestic market, better division of labour, and increased productivity through improvement in the ratio of labour force to population as well as enhancement of its political and military power. A large population also diversifies the demand for products and services and promotes the tendency to increasing returns to scale, thereby raising economic development (Yesufu: 2000).

Rapid population growth in Nigeria is equally associated with unemployment with figures ranging from 17 percent per annum for the entire population to 60 percent for the youths because job opportunities are fewer than the number seeking for them, and stagnating economic performance because a large proportion of available resources is consumed instead of being invested to generate growth (Federal Republic of Nigeria, 2004b). In addition, it poses continuous pressure on resource, particularly on agricultural land. For instance, due to high density of people in the Eastern states as much as 53 percent of the farming populations cultivate less than 0.4 hectares in a given year and in the more congested areas of those states most farmers cultivates only 0.2 hectares per year. The result is fragmentation of farmlands and their subdivision into smaller plots to accommodate the growing farming populace. With time, the small plots would become untenable for even subsistence farming, forcing those concerned to move into marginal soils, where greater degradation takes place with attendant reduction in agricultural output (Akinbode, 2003 Madu 2005). The application of modern farming techniques and fertilizers could assuage this problem, but unfortunately as a capital deficient country, the traditional methods of farming dominate agricultural practices in Nigeria.

Inevitably, therefore, population pressure on a fixed factor like land would usher in diminishing returns (Iniodu, 1998). This is one of the explanations of decreasing peasant income and accompanying widespread poverty among the rural dwellers, the incessant food shortages and insufficient calorie intake among the Nigeria people.The Nigerian government has no doubt tried extensively to find some lasting economic growth by engaging in economic planning.

However, the study is poised to answer the following research questions;

[1] What is the magnitude of effect of population growth on economic growth?
[2] What is the causal relationship between population growth and economic growth?
[3] Is there a sustainable long run relationship between population growth and economic growth?

OBJECTIVE OF THE STUDY

The broad objective of this research work is to establish the effect of population growth on economic growth.
The specific objectives are;

[1] To ascertain the magnitude of effect of population growth on economic growth.
[2] To investigate the causal relationship between population growth and economic growth.
[3] To determine whether long run relationship exist between population growth and economic growth.

RESEARCH HYPOTHESES

The research hypotheses are as follows;

H_{01}: Population growth has no significant effect on economic growth.
H_{01}: There is no significant causal relationship between population growth and economic growth.
H_{03}: There is no long run relationship between population growth and economic growth.

III. THEORETICAL FRAMEWORK

There is a marked difference in the models of technological and economic growth proposed by Malthus (Malthus and Smith 1798) and later Solow, which allow for no per capita growth of income as capital is fixed. However, later models do allow for per capital economic growth and appear to fit the observable conditions in the recent past. The Malthusian model is considered accurate in pre-industrial societies but fails to work correctly in industrialized environments. To reconcile the differences between the two fundamental environments, some have created multiphase models which allow for Malthusian, Post-Malthusian and finally Modern regimes, (Galor and Weil 1998) whilst others such as Simon-Steinmann (Simon 1986) have created two models, one of each of the two stylized named the More and Less Developed Countries (MDC and LDC respectively) (Simon 1977), effectively treating the two groups as distinctly separate. The rationale behind this distinction is that a "demographic transition" has occurred in one (the MDC) and is now beginning to occur in the LDC nations but under different circumstance. Most of these circumstances are economic in nature and the tacit assumption is that economics is the driving force behind the transition and not the other way around as has been suggested by Knodel and Van De Walle (Greenhalgh 1995). In the case of Galor- Weil model, there appears to be an assumption that today's economic world is different from the one that Malthus observed. Simon does not explicitly make this assumption but also does not deal with any historical perspective earlier than the industrial revolution other than anecdotal evidence of Greece and Rome in *"The Ultimate Resource",* in part due to lack of economic data.

Assuming that today's economic environment is operating using the same mechanisms as before, there is a question that needs an answer. Do current growth models accurately portray not just trends of population and economic growth but also elucidate the mechanisms by which the economic growth occurs? Based on the need for multi-phase models and separate handling of different types of economies, there is a good chance they do not. As well, Simon dismisses the effect of demographic anomalies on the short-term economics of nations in favour of long-term trends. He specifically dismisses the impact of age-structure and dependency ratio on economic growth as minimal compared to that of the level chosen for the savings rate (Simon 1977). What he does not deal with is the possible effect the age-structure and other demographic dynamics may have on the saving rate.Assuming there is a demographic effect on the level of investment, then it only stands to reason that these population dynamics have an effect on the short-term and long-term economic growth of the economy. Due to speed of the current demographic transition in LDC nations, these effects may be exacerbated and causing current observable conditions to appear different from those conditions leading to the wealth of the MDC nations.Using a simplified illustration based on current anthropological theory, the framework for the link between population growth, population size, carrying capacity of the land and economic growth will be explored. This possible link may also help elucidate some of the possible mechanisms for economic growth; something which Simon does little of, as he tends to approach the subject from the standpoint of having the model match known trends.

Simon-Steinmann Economic Growth Model : The basic idea to the theory proposed by Julian Simon and Gunter Steinmann is that the greater the total population, the greater the level of technological growth yielding the greater the per capita income. An idea derived from Boserup (Simon 1977), which Simon refers to as the "Population Push" model, and distinguishes between current knowledge and knowledge being applied for production.Underlying the population push model of technological development is the added idea that technology can and does develop independent of population growth (learning-by-doing) and therefore technology builds upon itself, reconciling the pull and push models of technological progress. So even in the case of a static population, there will be some level of technological advancement, albeit slower than in situations of growing population. It is just necessity remains the mother to, and is the primary force behind, invention. This technological progress function is added to the Douglas-Cobb production function to produce a model containing endogenous technological progress based on population growth and learning-by-doing. One other aspect of note in his model is that labuor supply and population are used synonymously as he dismisses the impact of age-structure and dependency ratio on economic growth as minimal to the effect of the savings rate. He uses Japan and the US as an example of the disparity between savings rate and the effect it has on output (Simon 1977).

The results of the model yield modest per capita economic growth at equilibrium and Simon determines that maximized long term economic growth (always in per capita terms unless otherwise noted) requires 1-2% per annum population growth and a 2-4% rate of savings with a low discount rate below 4%. At a higher discount rate of 5-10% there was still increased consumption. This population growth rate, he makes clear, is higher than the rate that produces the highest adoption of technology (Simon 1986). Any growth that occurs too fast will have diminishing return or create a circumstance where is stagnating. As well, modest negative population growth will have the effect of limiting growth but large negative out flows in population will stagnate growth outright. The level of total technology (available and in use) never decreases since this is, in his estimation, illogical. (Simon 1986).

EMPIRICAL LITERATURE REVIEW :

According to Aguirre (1999), "There are many groups taking part in the current population debate. All approach the question of population from very different points of view and with different motivations. A working knowledge of the parties and their underlying philosophies will allow one to sift through the diverse rhetoric and hold then up to the light of scientific data." Frank Furedi, in his book population and Development: A critical introduction, (1997) has provided a brief outline of the variety of approaches to the issues of population.The Easterlin (1985) framework is often used to explain fertility levels in developing countries. Unlike other theories on population that draws solely from economics, Easterlin framework is strengthened by its combination of the demand concept from economics and the supply concept on population from sociology (Macunovich, 2000). The argument is that declining infant mortality leads to an excess supply of children thus decreasing the demand for children and motivating fertility regulation. This is relevant in Nigeria because infant mortality and other indictors of socioeconomic development have made little progress since the recession of the 1980s. Caldwell's 91982) wealth flow theory of the expected social and economic returns to parents from their investment in children seems close to the current economic realities in Nigeria. The high cost of schooling the dwelling financial support form government, and the increasing unemployment of university graduates may have created the context for the reversal of the wealth flow (National research council, 1993).

Empirical studies which have used cross-country data to try and evaluate these claims, have however, found little evidence to support either argument. Once the effects of initial income, education and other determinants of growth are taken into account, population growth is found to have a negligible effect on growth of GDP (Bloom and Freeman, 1986). This gave rise to the "population neutralist" or "revisionist" perspective, which held that demography, was not a significant factor in the economic growth process. This view was in responsible for the tenuous position population variables have recently occupied in studies of economic growth. The study by Eke (1966) is a simple statistical approach that attempted at estimating the de jure population of Nigeria for the period of 1952 to 1965. The aim of Eke's paper was to point out the inadequacy of official Nigeria census statistics, the general intellectual confusion and the diseconomies inherent in political approach to census taking. In a related study, Olusanya (1966), tried to analyze the consequence of rapid population growth in Nigeria by drawing some lessons from the Mauritian experience. The study by Tuny (1984) can be regarded as one of the most comprehensive studies on the relationship between population growth and economic development. This model, which utilized time-series data from Taiwan, comprised about one hundred and fifteen equations and identities. The results obtained from the simulation showed that in the short – run, a reduced rate of population growth would bring about a higher rate of per capital income. However, it

must be noted have that these results did not consider the impact of migration especially, from the rural and the urban areas.Ogujiliba (2005) attempted to quantify and examine how changes in population dynamics affect household portfolio choices (expenditure on food, monetary transactions, goods and services and non-cash expenditure) in Nigeria given the fact that Nigeria is going through a demographic transition. Previous efforts to assess impacts of population growth have ignored the household expenditure response which has been far from being definitive on the transmission net effects on household portfolio choices. This study focuses on Nigeria with the aim of overcoming these defects and obtaining reliable information. The study established a link between demographic variables and household expenditure components using the Vector Error Correlation Methodology. Next the estimated equations are used to project the pattern of the different components of expenditure income based on three population scenarios generated from different assumptions on changes in fertility. The results suggest that population growth in Nigeria can produce significant effects on the economy via the expenditure profiles of households. The results also suggest that other factors such as real per capital income, ratio of other expenditure categories to total expenditure influence growth of household expenditure components.

Oladosu (2001) suggest that the prospects for fertility decline in Nigeria are bright. Trends in the use of contraception between 1990 and 1999 increased. The proportion of women who had births in the five years before survey declined. More women think that they have the same reproductive goals as their husband. These are favourable indicators for future decline. In addition, young women who work away from home are more likely to use contraception; they are more likely to not have had birth in the fives years before data collection and are more likely to have the same desire for children as their husbands. Young women who married at later ages are likely not to have births in recent years (at the time of survey).Shavazi and Jones (2001) explore population dynamics and characteristics of Muslim population to aid deeper understanding of the Muslim world having defined Muslim-majority countries and countries with large Muslim populations, the study explains demographic, social and economic characteristics of Muslim populations, and second, analyze demographic transition in the Muslim world. A population policy in Muslim majority countries was examined.Makinwa and Adebusoye (1991) analyzed the adolescent reproductive behaviour in Nigeria using five cities which are Enugu, Kaduan, Jos, Onitsha and zaria as a case study. The findings indicated that the lives of a large segment of Nigeria's youth may be in jeopardy in many ways from early unguarded sexual resulting in unwanted pregnancies, disruption of education and illegally induced abortions.

IV. METHODOLOGY

The research instrument employed in the course of this analysis is the econometric method because it facilitates model specification, parameter estimation, and the conduct of appropriate statistical and econometric tests.

3.1 MODEL SPECIFICATION

Based on the adopted approach, we can specify the model with the following functional relationship mathematically as

$RGDP = F(POP)$ ---------- (1)

The model is specified econometrically as;

$RGDP_t = \beta_0 + \beta_1 POP_t + \mu_i$ ----------(2)

MODEL 2

Model 2 is specified to determine the direction of causality between RGDP and POP.

$RGDP_t = \sum \alpha_I POP_{t-i} + \sum \beta_j RGDP_{t-j} + \mu_{1t}$----------(3)

$POP_t = \sum \lambda_i POP_{t-i} + \sum Б_j RGDP_{t-j} + \mu_{2t}$ ----------(4)

MODEL 3

To find whether there is long run steady state path, equation (2) is remodeled as;

$\mu_t = RGDP_t - \beta_0 - \beta_1 POP_t$----------(5)

To know the rate at which short run disequilibrium is adjusted, we model the Error correction mechanism (ECM) as;

$RGDP_t = \beta_0 + \beta_1 POP_t + \mu_{t-1} + \varepsilon_t$

Where;

RGDP = Real Gross Domestic Product

POP = Population

μ_t = Stochastic Error Term

ε_t = New stochastic Error Term

μ_{t-1} = The Error Correction Factor

ESTIMATION PROCEDURE :

The procedure for estimation adopted in this study is the ordinary least square (OLS) single equation method. This was used to estimate the model under study.This method attributed to Carl fried-Rich Gauss, a German mathematician is preferred because it is easy to understand, sample in its computational procedure plus its parameter estimates, which have some optional properties of linearity, unbiasedness estimators.Thus, the OLS estimator posses the BLUE properties of Best, linear, and Unbiased Estimator, which is consistent and sufficient.The ordinary least square technique is relatively available software packages for use like the MS Excel, PC Give Eviews and SPSS that are users friendly. Data requirement are also minimal and it is also easier to understand by non-experts in econometric methodology. The Eviews econometric package was adopted for this analysis.However, the following are some of the assumptions underlying OLS according to the Gaussion classical linear Re-gression model (CLRM) which is the cornerstone of most econometric theory, Gujarati (1995:59).

Assumption 1.

That the regression model is linear in parameter

$Yi = B1 + B2\ X\ I + u_t$

Assumption 2

That the independent variables (xi) values are fixed in repeated sampling, put more technically, xj are assumed to be non-stochastic.

Assumption 3

That the disturbance term has a zero mean value.

$E(\mu i/Xi) = 0.$

Assumption 4

(HOMOSCEDASTICITY)

That given values of X, the variances of μi is the same for all observations that is

$Var\ (\mu i/Xi) = Б^2.$

Assumption 5

That there is no autocorrelation between the disturbance term that is cov (μi, μj/Xi, Xj) = 0

Assumption 6

That there is zero covariance between μi and Xi

Cov (μi, Xi) = 0

Assumption 7

That the number of observation (n), must be greater than the number of parameter to be estimated.

Assumption 8

That there is no perfect multicollinearity among the explanatory variable.

That is E (Xj, Xi) = 0

Others include that the models are correctly specified and that there is variability in X's values.

TECHNIQUES FOR EVALUATION OF THE RESULT : The techniques for evaluation of the result will be based on economic a "priori" expectations, statistical tests of significance and econometric tests.

EVALUATION BASED ON ECONOMIC CRITERIA : Under these criteria, the a priori expectation (signs and size) of the parameter estimates of the variables in the model will be evaluated to check whether they conform to economic theory.

EVALUATION BASED ON STATISTICAL CRITERIA
(FIRST ORDER TEST)

R^2: This measures or explain the total variation in the dependent variable (Real gross domestic product) caused by variations in the explanatory variable (population growth)
included in the model.

The t – Test

This test is used top test whether the variables included in the model are individually statistically significant or not. Adopting the "2 – t" rule of significance we reject Ho if the computed t – value if greater than 2.
This implies that the variable is statistically significant.

The f-Test
This test is used to determine the overall significance of the regression model. We reject Ho, if the P – value of 'f' obtained is sufficiently low.

EVALUATION BASED ON ECONOMETRIC CRITERIA
(SECOND ORDER TEST)
STATIONARITY TEST

This is to test whether the mean value and variance of the stochastic term are constant overtime. The Augmented Dickey – Fuller (ADF) test is appropriate.

COINTEGRATION TEST : This is to test whether the variables have long term relationship or are stable overtime, as a result of their different order of integration. The Augmented Dickey-Fuller (ADF) (Using the residuals) test will be used to confirm whether long-run relationship exists.

GRANGER – CAUSALITY TEST : This test is carried out to test whether economic growth causes population growth (unidirectional causality or population growth causes economic growth or economic growth and population growth causes each other (bilateral causality). In applied work, the Granger causality test has received considerable attention. But one has to exercise great caution in using Granger test because it is very sensitive to the lag length used in the model. Granger causality follows the F-distribution.If the computed F – value exceeds the critical F – value at 5% level of α, we reject the null hypothesis with
M
n– k degree of freedom (df).
M = number of lagged m term.
K = number of parameters estimated.

NORMALITY TEST : This test is carried out to test whether the error term followed the normal distribution. The normality test adopted is the Jarque-Bera (JB) statistics which follows the chi-square distribution.

TEST FOR AUTOCORRELATION : This is to test whether the errors corresponding to different observations are uncorrelated. The test statistic adopted for this test is the Durbin- Watson statistic

TEST FOR SPECIFICATION ERRORS : This test is carried out to test whether the estimated model is correctly specified or not. The Ramsey RESET test is adopted in this test.

SOURCES OF DATA : The nature of data employed in this research work is secondary data sourced from the Central Bank of Nigeria (CBN) statistical bulletin special edition 2009 and materials from National Bureau of Statistics (NBS). 2008 publication.

EMPIRICAL RESULT : The results of the ordinary least square regression are presented below. The estimates of the regression result were subjected to various economic, statistical and econometric tests.
Presentation of Regression Results
Dependent variable: RGDP

Variable	Coefficient	Std. error	t-statistic	Prob. value
CONSTANT	286.3874	21.59006	13.26478	0.0000
POP	5.562162	0.230783	24.10601	0.0000

R-squared = 0.925171
Adjusted R-squared = 0.923578
F-statistic (1, 48) = 581.0998
Durbin-Watson stat = 2.005512
Result is shown in Appendix II

V. EVALUATION OF REGRESSION RESULT

Economic "a priori" criterion

Variable	Sign	Interpretation
CONSTANT	Positive	Conformed to "a priori" expectation
POP	Positive	Conformed to "a priori" expectation

A critical examination of the coefficients reveals that the variable conformed to "a priori "expectation.

CONSTANT : The constant conformed to "a priori" expectation. The constant term represents autonomous Real Gross Domestic Product and it is positive .It stipulates that Real Gross Domestic Product (economic growth) will increase by 286 when population growth is not operational.

POPULATION GROWTH (POP) : The result of our study supports the hypothesis of a positive relationship between population growth and economic growth. This implies that a 1% increase in population growth will increase economic growth by 5.6%

EVALUATION BASED ON STATISTICAL CRITERION

Coefficient of Determination (R^2)

The R^2 value is 0.93 and R^{-2} (adjusted for loss in degree of freedom) is 0.92. The value of R^2 shows that the model explains variations in Real Gross Domestic Product to the tune of 93%

T-Test

This is used to test the significance of each of the parameter estimates with n-k degrees of freedom at 5% level of significance. The following hypothesis is tested.

H_o : $\beta_1 = 0$ (The parameter estimates are statistically significant)

At $\alpha = 5\%$ with n-k degrees of freedom

Decision Rule:

Reject H_o if $t_{cal} > t_{\alpha/2}(n-k)$ or $-t_{cal} < -t_{\alpha/2}$ (n-k)

Accept if otherwise.

Where;

n = number of observation

k = number of parameter estimates

α = level of significance

From the t-distribution table for a two-tailed test at 5% level of significance with 48 degrees of freedom (i.e. 49-1), the tabulated value of

$t_{0.025} = 2.04$

The result for the t-test is presented below based on the value of the tabulated t-value above.

Variable	t-values	t-tabulated	Decision	Conclusion
CONSTANT	13.26478	2.04	Reject	Significant
POP	24.10601	204	Rejected	Significant

From the table above, we can infer that the variables are significant at 5% level. Thus, they have significant impact on economic growth.

The F-Test

The F-Test measures the overall significance of the model. The null hypothesis is stated thus;

H_O : $\beta_1 = 0$ (The model is not significant)

Against

H_1: $\beta_1 \neq 0$ (The model is significant)

At $\alpha = 5\%$ with k-1 (v_1) and n-k (v_2) degrees of freedom.

Where,

V_1 = numerator

V_2 = denominator
Decision Rule
Reject H_o if $F_{cal} > F_{0.05}$ (v_1-v_2) d.f
Accept if otherwise.
From the regression result, F_{cal} = 581.0998.
From the F-distribution table $F_{0.05}(1,48)$ = 2.53.
Since 581.0998 > 2.53, we reject H_o and conclude that the overall regression is statistically significant at 5% level of significance . it implies that the model has a good fit. This means that individual independent variable significantly impact on economic growth. That is, there exists a significant relationship between the dependent variable and the explanatory variable.

UNIT ROOT TEST : The test is carried out to know whether the mean value and variances of the variables are time invariant, that is, constant over time. The unit root test for stationarity is applied using the Augmented Dickey Fuller (ADF) test. The null hypothesis is tested thus;
H_O : Б = 0 or p = 1 (The variables are non-stationary)
Against,
H_O : Б ≠ 0 or p < 1 (The variables are stationary)
We assume 5% critical value (5% level of significance), to compare with the ADF result.

DECISION RULE : Reject H_O if the absolute values for the calculated ADF for any of the variables are greater than the absolute value of the 5% critical values.

ORDER OF INTEGRATION

		Integrated of order zero1(0)		Integrated of order one1(1)
VARIABLES	ADF statistic	Mackinnon critical value 5%	ADF statistic	Mackinnon critical value 5%
RGDP			-6.565318	-3.5066
POP			-9.601838	-3.5066

From the table above, we can see that the variables are stationary after taking their first difference.

VI. MODEL 2 RESULT

GRANGER CAUSALITY : To test whether economic growth causes population growth (unidirectional causality) or population growth causes economic growth or economic growth and population growth cause each other (feedback causality), we apply the F-test given by equation (4.3.1)

$$F = \frac{(RSS_R - RSS_{UR})/m}{RSS_{UR}/(n-k)}$$

Which follows the F-distribution with m and (n-k)d.f.
The null hypothesis in each case is that the variable under consideration does not cause the other variable.

DECISION RULE : Reject H_O if the computed F-value exceed the critical F-value at 5% level of significance. The following result was obtained;
F - critical values = 3.32 at 5%

Direction of Causality	F - value	Decision
At LAG: 2		
POP ⟶ RGDP	3.48492	REJECT
RGDP ⟶ POP	1.62490	Do not reject
AT LAG : 4		
POP ⟶ RGDP	1.61451	Do not reject
RGDP ⟶ POP	0.47817	Do not reject
AT LAG : 6		
POP ⟶ RGDP	1.22160	Do not reject
RGDP ⟶ POP	0.38715	Do not reject

The results suggest that there is unidirectional causality between population growth and economic growth. This implies that population granger causes economic growth at lag:2. More so, mutual independence is population growth and economic growth.

VII. MODEL 3 RESULT

COINTEGRATION RESULT : Since we do not want to lose any useful information due to differencing, we carry out a cointegration test on the estimated model (ie model 1). This is carried out using the Augmented Dickey Fuller (ADF) test on the residuals obtained from the regression under the following hypothesis.

H_O : Б = 0 (not integrated)

Against,

H_O : Б ≠ 0 (cointergrated)

Decision Rule

Reject H_o if $t_{cal} > t_{tab}$

The following result was obtained.

variable	t - ADF	Critical value
Residual (U_{t--1})	-6.460503	-3.5745
		-2.9241
		-2.5997

From the table above, since the absolute value of computed t - ADF > critical t - ADF,when compared both at 1%, 5%,and 10% . We conclude that the estimated error term is stationary which means that there is a sustainable longrun relationship (steady –state path) between economic growth and population growth.

DIAGNOSTIC TEST RESULTS

NORMALITY TEST : The test is conducted to check whether the error term follows the normal distribution. The normality test adopted is the Jarque - Bera (JB) statistic, which follows chi—square distribution with 2.d.f . The hypothesis to test is :

H_O : u_i = 0 (Error term is normally distributed)

H_O : u_i ≠ 0 (Error term is not normally distributed)

Level of significance = 0.05

DECISION RULE :

Reject H_o if JB cal >JBtat, accept otherwise.

Application of the JB test shows that JBcal =0.78756 and the probability of obtaining such a statistic under the normality assumption is about 67% while the JB_{cal} = 5.99.

Since JB_{cal} (0.80) < JB_{tab}(5.99) (2df) with high probability, we do not reject the null hypothesis and conclude that the error term is normally distributed .Also, looking at the histogram (see appendix) we observe the that the residual is normally distributed.

TEST FOR AUTOCORRELATION

This was carried out in this study using the Durbin-Watson t-statistic. The hypothesis to be tested is stated thus,

H_O : Б = 0 (No autocorrelation)

H_O : Б ≠ 0 (Autocorrelation exists)

DECISION RULE: If computed Б-value is less than dl, there is evidence of positive first-order serial correlation; if it is greater than d_u, there is no evidence of positive first-order serial correlation, but if d_{cal} lies between the lower and the upper limit, there is inconclusive evidence regarding the presence of positive first-order serial correlation. The summary of the decision rule is presented in table (4.52) below:

DURBIN-WATSON TEST: DECISION RULE

NULL HYPOTHESIS	DECISION	IF
No positive autocorrelation	Reject	$0 < d < d_l$
No positive autocorrelation	No decision	$D_L \leq d \leq d_u$
No negative correlation	Reject	$4 - D_L < D < 4$
No negative correlation	No decision	$4 - D_U \leq D \leq 4 - D_L$
No autocorrelation, positive or negative	Do not reject	$D_u < d < 4 - D_U$

From the regression result (see appendix). We can observe that the Durbin-Watson statistic d = 2.0055, Also, the significant points of d_l and d_u from Durbin-Watson table at 0.05 level of significant are

d_L = 1.161

d_u = 1.859

(Using t6he fifth decision rule, we have)

$d_u < d < 4-d_u$

$1.859 < 2.006 < 4- 1.859$

$= 1.859 < 2.006 < 2.141$

(with k = 1 and n =49)

From the result above, we do not reject the null hypothesis of no autocorrelation positive or negative and conclude that there is no evidence of positive or negative first- order serial correlation.

SPECIFICATION ERROR TEST : This test was employed to find out if there exists specification error in our model. That is to know whether our model is mis-specified or not. The Ramsey's RESET TEST was employed. It follows the F-distribution.(see appendix)

We tested the following hypothesis:

$H_O : \beta_1 = \beta_2 = 0$ (mis-specified)

Against,

$H_O : \beta_1 \neq \beta_2 \neq 0$ (well specified)

DECISION RULE : If the computed F-value is not significant at the 5% level, one can accept the hypothesis that the model is mis-specified, otherswise we reject it

F_{cal} = 29.44534

Since $F_{cal\ is}$ significant, we reject the hypothesis and conclude that the model is correctly specified.

EVALUATION OF WORKING HYPOTHESIS

The research hypothesis of this study include:

H_{o1} : population growth has no significant impact on economic growth.

H_{o2} : There is no significant causal relationship between population growth and economic growth.

H_{o3} : There is no long run relationship between population growth and economic growth. These hypothesis can be evaluated from the result of our models. From the t-test that were carried out on the explanatory variable, we found population growth to be statistically significant. This means that population growth scientifically impact on economic growth.

From model 2 result, we found that there is a unidirectional causality between population growth and economic growth. This means that population growth significantly causes economic growth.

From model 3 result, the cointegration test carried out shows that there is a sustainable long run relationship or steady-state path between economic growth and population growth, since t* - adf is greater than critical t –adf whether at 1%, 5%, or 10%.

We therefore draw the following conclusions based on the findings above;

- For the first hypothesis, we reject the null hypothesis that population growth has no significant impact on economic growth and accept the alternative hypothesis.
- For the second hypothesis, we reject the null hypothesis that there is no causal relationship between population growth and economic growth and accept the alternative hypotheses.
- For the third hypotheses, we reject the null hypothesis that there is no long run relationship between economic growth and population growth and accept the alternative hypothesis.
- For the third hypothesis, we reject the null hypothesis that there is no long run relationship between economic growth and population growth and accept the alternative hypothesis .

VIII. CONCLUSION AND POLICY IMPLICATIONS

SUMMARY OF FINDINGS : This study has reviewed and elaborated on the empirical issues pertaining to economic growth and the influence of population growth on the economy. Thus, modeling Real Gross Domestic Product (as a proxy for economic growth) against population growth. From our analysis, it is evident from the results obtained that population growth has significant impact on economic growth.In the same vein, the study also found that there is a sustainable long run relationship (steady-state path) between economic growth and population growth. There is also the evidence of unidirectional causality between population growth and economic growth. The correlation between economic growth and population growth can provide a channel for monetary policy transmission.

IX. CONCLUSION

This study examines the impact of population growth on economic growth. Our conclusions is that economic growth formed a significant relationship with population growth.The existing state of knowledge does warrant any clear-cut generalization as to effect of population growth on economic growth in today's less developed countries. The actual evidence on thee association between growth of population and economic growth not point to any uniform conclusion. But it is possible that the effect of population growth on economic growth rates, densities, and income levels as do today's less developed countries. Clearly, there is need for more intensive research on the actual experience of nations, currently and in the past.

POLICY RECOMMENDATIONS

Based on our analysis and research findings, we recommend the following policy guidelines:

- From our analysis, for population growth to positively impact on economic growth, one idea would be to let the level of per capital technology to increase. This will lead to better resource utilization in the economy.
- Savings rate of Nigerians should increase as this will be used to invest in more research and new techniques. Each of these techniques being a less than perfect substitute requiring more labour or resource of a different, more labour intensive type and therefore added more value added services to the production. This continues to add to the total output at a higher rate than population growth, raising per capital out as a result.
- Government should make concerted effort to check population growth rate. Any population growth that occurs too fast will have diminishing returns or create a circumstance where economic growth is stagnating.

Policy- makers need to be careful too when trying to influence the economy through changes in macroeconomic variables such as money supply or interest rate. While aiming to correct macroeconomic ills such as inflation or unemployment. They may inadvertently depress economic growth.

REFERENCE

[1] Aguirre, M. S. (2007) "Population Resources and Environment: A Survey of
[2] the Debate'', The Catholic Family and Human Right Institute.TheCatholic University of America.
[3] Caldwell J.C (2002). The Theory of Fertility Decline. Academic Press, New York.
[4] Caldwell, John C. I. O. Oruboloye, and Pat Caldwell (2006). Fertility Decline in Africa: A new type of transition? Population and Development Review 9new York) 1vol.8,No.2, pp. 211-242.
[5] Central Bank of Nigeria Statistical Bulletin 2008.
[6] Coale, A. J and Hoover, E. A (2007). Population Growth and Economic Development in Low-income Countries. Princeton, New Jersey; Princeton University Press.
[7] Damoder, N. Gujarati (2003) "Basic Economics''. Tata McGraw-Hill Book Company Limited, New York.
[8] Easterlin, R. A. and E. M. Crimmins (2001). The Fertility Revolution: A Supply-Demand Analysis. Chicogo: University of Nigeria Chicago Press.
[9] Federal Ministry of Healh (1998). National Policy on population for Development, Unity, Progress and Self-reliance. Federal Ministry of Health, Lagos, Nigeria.
[10] Furedi, F. (2004) "Population and Development: A Critical Introduction'' In Aguirre, M.S. ed population, Resources and Development.
[11] Ibeahim, Mantu (2001). Implications of population Growth fore the Nigeria Economy and Environmental. Olive de L' Afrique Consult Abuja
[12] Lesthaeghe, R. (2005). Reproduction and Social Organization in Sub-Saharan Africa. Berkeley; University of California Press, Berkeley.
[13] Macunovich, J. Diane (2000). Relative Cohort Size: Source of a unifying theory of global fertility transition? Population and Development Review, vol.26,No.20 pp.235-261.
[14] Michael, P. Todaro, Stephen C. Smith (2003). Economic Development, Pearson Education (Singapore) etc. Ltd, India Branch.
[15] Mohammad Jalal Abbasi – Shavazi and G. W. Jones (2001). Socio-Economic and Demographic Setting of Muslim populations.
[16] National population Commission (2000). Nigeria Demographic Health survey 1999. Calverton, Maryland: National population Commission and ORC/Macro.
[17] Ogujiuba, Kanayo (2005). Challenges of population Dynamics in Nigeria: Implications of Household's Portfolio Choices. Department of Economics, University of Nigeria.
[18] Oladosu, Muyiwa (2001). Prospects for Fertility Decline in Nigeria: Comparative Analysis of the 1990 and 1999 NDHS data.
[19] Taylor and Francis, (2008). Consequences of Rapid population Growth in Developing Countries. New York Inc.
[20] United Nations (2006). World population Prospects. The 1998 Revision Comprehensive Tables. Vol.1, New York
[21] United States of America, Bureau of the Census (2001). The International Data Base (IDB)