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Determinants Of Population Growth In Nigeria

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Abstract: ***This study investigates the determinants of population growth in Nigeria using annual time series data for the period 1980 to 2018. Previous studies to the best of our knowledge employed the ordinary least's squares technique in the data analysis but this study filled this gap by adopting the ARDL bound test approach and findings from the analysis of the time series data indicated that Infant mortality rate has a negative and insignificant relationship with population growth rate in the long run, life expectancy at birth has a negative and insignificant relationship with population growth rate in the long run, maternal mortality rate has a negative but significant relationship with population growth rate in the long run, per capita income has a positive and significant relationship with population growth rate in the long run and total fertility rate has a positive and significant relationship with population growth rate in the long run. The study recommended that the federal government should prioritized family planning, government should promote education of the girl child in order to avert early marriage and child births leading to lower fertility in women and civic education of the populace on the danger of increasing population should be encouraged at all levels in the country.***

Keywords: Population, Growth, ARDL, Nigeria.

I. INTRODUCTION

Nigeria's population of more than 200 million people is the largest in Africa and seventh largest in the world. With a population growth rate of 2.54 % Nigeria's population momentum is high implying that Nigeria will have to double its food production, provision of health services, water supply, housing, sanitation, electricity for the populace. Globally, there are numerous factors that cause high population growth. In Nigeria, the high rate of fertility particularly in the Northern region of the country is a major cause of rapid population growth in the region.

In realization of the rapid growth of the Nigerian population and its adverse effect on national development and family welfare, various administration have formulated national policies on population to attain lower growth rates of population by way of decrease in birth rates by voluntary control of fertility that are well-matched with the achievement of economic objectives of the country, amongst others,(Ihejiamaizu, 2002).

However, rapid population is a window of opportunity to nations globally. Growing population will engender increase in manpower particularly in the long run. The children who are much will join the labour force in the future and increase the number of the working population. More so, a rising population will arouse demand and alter pattern of investment. A large population of children denotes large production of materials required by the children. A lot of manufacturers will alter their pattern of production and move to the manufacturing of children's products. Thus, a rapid population can stimulate economic growth, (NDHS, 2013).

On the other hand, the effects of increasing population leads to species extinction, deforestation, desertification, climate change as well as the destruction of natural ecosystems on one hand; and joblessness, demands on housing, transportation, traffic congestion, pollution and

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infrastructure, security and strain on basic amenities,(Dominic, Oluwatoyin and Fagbeminiyi, 2017). An increasing population caused by high rate fertility will enlarge the dependency ratio and workers will have more dependants. Greater dependants on the workers will lead to social burden and economic liability on the workers. Having met their needs and that of their dependants, there will be little or nothing left out of their income. This will decrease savings and there will be less capital formation. This in turn will hinder the country's socioeconomic development. Another effect of a population that increases rapidly is the low level of income per person. There will be less income or resources per person. The effect of this is poor living standard or general fall. The consumption of goods and services per person will be small. This can results to consumption of sub standard goods and low-grade commodities.

Furthermore, a high population density promote the spread of infectious diseases such COVID 19 (corona virus) leading to deaths of many people globally.

Thus, the objective of this paper is to investigate the determinants of population growth in Nigeria. The remaining part of the paper is structured as follows: next is the literature review and theoretical framework, followed by the methodology in section III, results and discussions of findings are in section IV. Conclusions and recommendations are in section V.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

A. LITERATURE REVIEW

Nyoni (2018) examined the determinants of population growth in Pakistan from 1960 to 2017. Using ordinary least squares technique, the study indicated that a 1% increase in contraceptive prevalence rate, life expectancy at birth and infant mortality decrease in population growth in Pakistan while a 1% increase in unemployment, total fertility rate and per capita income increase population growth in Pakistan.

Dominic et al (2017) inspected the factors influencing Nigeria's population growth. Time series variables such as population growth rate, GDP per capita, infant mortality rate, maternal mortality rate, human development index, proportion-of-labor-force employed were used in the study. The data were sourced from the World Development Indicators (WDI) and Human Development Report (HDR). The study adopted the Johansen Co-integration econometric technique in the analysis of the data and findings revealed that infant mortality and maternal mortality rates have long run relationship and are the factors influencing population growth in Nigeria.

Huda (2014) investigated the determinants of population growth in Pakistan and concluded that there are numerous factors contributing to growth of population in Pakistan and there include high fertility rates, insufficient family planning practices, illiteracy, lack of political will, ineffective governance, cultural as well as religious environment.

Wei, Jiang and Zhang (2015) reviewed population growth models as well as factors affecting the population of China and concluded that both the extent of urbanization as well as the sex ratio, have considerable effects on China's population growth.

Singh, Mittal, Sharma, Smarandache (2017) examined the determinants of population growth in Rajasthan (India) and concluded that there are lots of demographic and socio – economic factors accountable for growth of population and these comprise of death rate, crude birth rate, and crude death rate among others.

B. THEORETICAL FRAMEWORK

The Malthusian theory of population is adopted as the theoretical framework. This theory affirms that human population grows geometrically while the means of subsistence grows arithmetically being subject to the law of diminishing returns. This theory reveals how rapid population growth hinders economic development in a country. This is a typical problem in the economy of Nigeria were the country's large population results high rate of unemployment and underemployment, increase in crime rate and insecurity, poverty, among others. Thus, the Malthusian population trap contends that rapid population growth leads to economic crises in a nation (Nyoni & Bonga, 2017).

III. RESEARCH METHODOLOGY

This research was designed to estimate the determinant of population growth rate in Nigeria from 1980 to 2018. The choice of years is based on the fact that the Nigeria's experience high growth rate of population during this period. Ex-post facto research design was adopted for the study while the model estimation was based on the method of autoregressive distributed lag (ARDL) since the time series have diverse order of integration.

A. MODEL SPECIFICATION

The model in this study is specified as:

$$POPGR = f(LEB, MMR, IMR, TFR, PCI) \quad (1)$$

Where:

POPGR = Population growth rate measured in percentage
LEB= Life expectancy at birth measured in years
MMR = Maternal mortality rate measured in percentage
IMR = Infant mortality rate measured in percentage
TFR= Total fertility rate measured in percentage
PCI = Per capita income measured in percentage

In the linear form,

$$POPGR=a_0+a_1LEB+a_2MMR+a_3IMR+a_4TFR+a_5PCI+U \quad (2)$$

Was estimated where $U_{1=}$ stochastic error term and other variables as earlier defined.$a_0$is the constant term;a_1,a_2,a_3, a_4 and a_5 are the regression coefficients.$a_{1<0}$,$a_{2<0}$,$a_{3<0}$,$a_{4>0}$. $a_{5>0}$.

We also estimated the above equation in the non-linear form:

$$Ln\ POPGR = b_0 + b_1 lnLEB + b_2 lnMMR + b_3 lnIMR + b_4 lnTFR + b_5 lnPCI + U \quad (3)$$

Where b_0 =constant term;b_1,b_2,b_3, $b_4$and b_5 are the regression coefficients.$b_{1<0}$,$b_{2<0}$,$b_{3<0}$,$b_{4>0}$,$b_{5>0}$

IV. RESULTS AND FINDINGS

A. UNIT ROOT TESTS FOR THE VARIABLES

Variables	Level (first difference)	Phillip-Perron Critical (5%)	Order of Integration	Remark
POPGR	-3.090717	-2.941145	I(0)	Integrated of order zero
IMR	1.520331 (-5.203092)	-2.941145 -2.943427	I(1)	Integrated of order one
LEB	-2.358474 (-21.22978)	-2.941145 -2.943427	I(1)	Integrated of order one
MMR	-0.361298 (-6.866617)	-2.941145 -2.943427	I(1)	Integrated of order one
PCI	-0.742414 (-5.254068)	-2.941145 -2.943427	I(1)	Integrated of order one
TFR	-1.656914 (-3.097685)	-2.941145 -2.943427	I(1)	Integrated of order one

Table 4.1: Phillip-Perron (PP) Test of Unit Roots

Researcher's computation, 2020

From table 4.1, using the Phillip-Perron (PP Test of Unit Root only POPGR is stationary at level the other variables namely, IMR, LEB, MMR, PCI and TFR are all stationary at first difference.

B. LAG LENGTH SELECTION CRITERIA

The result of the lag length criteria is presented in tables 4.2. The lag length of two (2) was selected for the equation based on the Akaike information criterion.

VAR Lag Order Selection Criteria
Endogenous variables: POPGR IMR LEB MMR PCI TFR
Exogenous variables: C
Date: 03/20/20 Time: 10:56
Sample: 1980 2018
Included observations: 37

Lag	LogL	LR	FPE	AIC	SC
0	-570.7046	NA	1391700.	31.17322	31.43445
1	-341.5972	371.5255	41.90491	20.73498	22.56359*
2	-280.3807	79.41600*	12.58197*	19.37193*	22.76792

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 4.2: Lag length selection criteria

a. BOUNDS TESTS

ARDL Bounds Test
Date: 03/20/20 Time: 10:59
Sample: 1982 2018
Included observations: 37
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	5.820800	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Table 4.3: Bounds Tests for the Existence of Cointegration

Test of cointegration for the equation indicates that the computed F-statistic of 5.820800 is greater than the lower and upper bounds critical values of 2.96 and 4.18, respectively at the 5 per cent significance level, using Pesaran et al (2001). Therefore, the null hypothesis of no cointegration is discarded, meaning that there is evidence of a long run relationship amongst popgr, imr, mmr, leb, pci and tfr.

b. SHORT-RUN ARDL RESULT

Dependent Variable: Population growth rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POPGR(-1))	0.526761	0.138529	3.802532	0.0009
D(IMR)	-0.000214	0.002066	-0.103437	0.9185
D(LEB)	0.003449	0.014014	0.246083	0.8077
D(LEB(-1))	-0.008683	0.004101	-2.117602	0.0448
D(MMR)	0.000009	0.000130	0.069107	0.9455
D(PCI)	0.000077	0.000026	2.996769	0.0063
D(TFR)	0.209714	0.194543	1.077979	0.2918
D(TFR(-1))	-0.447968	0.257575	-1.739175	0.0948
ECM (-1)	-1.289105	0.192064	-6.711867	0.0000

Table 4.4: Estimates of the Short Run Coefficients ARDL

The short run coefficients of the equation are presented in Table 4.4. As shown, the estimates of one year lag value of life expectancy at birth, present value of per capita income as well as one and year lag value of total fertility rate are statistically significant at 5 percent and 10 percent respectively implying that these variables seem to impact significantly on short run population in Nigeria.

The present value of infant mortality rate has a negative coefficient. The coefficient of infant mortality rate indicates that in the short run, a one per cent increase in infant mortality rate reduces population growth rate by 0.0002 per cent. Similarly, one year values of life expectancy at birth and total fertility rate all have negative coefficients. This implies that a one per cent increase in one year values of life expectancy at birth and total fertility rate reduces population growth rate by

0.009 and 0.45 per cent respectively in the short run. On the other hand, estimates of present values of life expectancy at birth, maternal mortality rate, per capita income as well as total fertility rate all have positive coefficients indicating that a one per cent increases in present values of life expectancy at birth, maternal mortality rate, per capita income as well as total fertility rate will increase population growth rate by 0.003, 0.000009, 0.00008 and 0.21 percent respectively in the short run. Furthermore, the coefficient of ECM has the correct sign which is negative as well as statistically significant at 5 per cent level. The ECM result indicates a slow speed of adjustment of about 12.89 per cent from the short run to the long run.

c. LONG-RUN ARDL RESULT

Dependent Variable: Population growth rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMR	-0.000166	0.001608	-0.103086	0.9188
LEB	-0.005159	0.009508	-0.542528	0.5925
MMR	-0.000465	0.000094	-4.966657	0.0000
PCI	0.000059	0.000017	3.585188	0.0015
TFR	0.274224	0.035616	7.699362	0.0000
C	1.600999	0.510314	3.137285	0.0045

Table 4.5: Estimates of the Long Run Coefficients ARDL

The long run coefficients equation is presented in Table 4.5. As shown, all the variables conform to the economic theoretical expectation. Maternal mortality rate, per capita income and total fertility rate are statistically significant at the five per cent level depicting that these variables seem to impact significantly on long run population growth rate in Nigeria.

Observably, infant mortality rate, life expectancy at birth and maternal mortality rate all have negative coefficients. This implies that a one per cent increase in infant mortality rate, life expectancy at birth and maternal mortality rate reduces human Nigeria's population growth rate by 0.0002, 0.005 and 0.0005 per cent respectively. On the other hand per capita income and total fertility rate all have positive coefficients indicating that a one per cent increase per capita income and total fertility rate increases Nigeria's population growth rate by 0.00006 and 0.27 per cents respectively in the long run.

d. DIAGNOSTIC TESTS

Normality Test

H0: Residual is multivariate normal H1: Residual is not multivariate normal

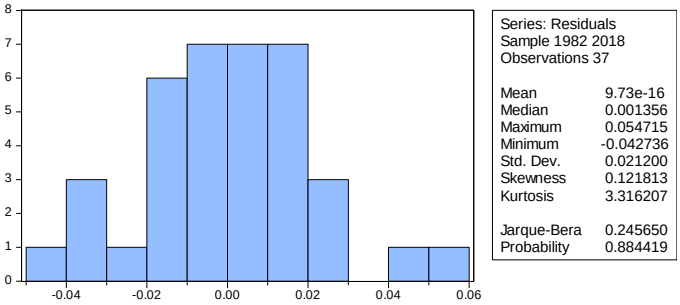

Figure 1

Jacque Bera stat with value 0.245650 and prob. Value of 0.884419 which is greater than 0.05 levels. Hence, the study accepts the null hypothesis which specified that the residual is normally distributed.

Test For Residual Auto-Correlation

Breusch-Godfrey Serial Correlation LM Test.
H0: there is no serial correlation.
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.235336	Prob. F(2,22)	0.0587
Obs*R-squared	8.409176	Prob. Chi-Square(2)	0.0149

Table 4.6

From the above table, considering the prob Chi- square value of 0.0149 which is less than 5%. Hence, the study accepts the H0 which specified that there is no serial auto-correlation.

Heteroscedasticity Test

H0: there is no ARCH effect
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	4.382658	Prob. F(12,24)	0.0010
Obs*R-squared	25.40608	Prob. Chi-Square(12)	0.0130
Scaled explained SS	12.37953	Prob. Chi-Square(12)	0.4157

Table 4.7

From the table above, the prob. chi-square value of 0.0130 which is less than 0.05 level of significance. The result indicates rejection of null hypothesis of equal or constant variance. This implies existence of homoskedasticity. Non equal variance or heteroskedasticity is therefore assumed.

C. DISCUSSIONS OF FINDINGS

Based on findings from the ARDL results, Infant mortality rate has a negative relationship with population growth rate in Nigeria. This outcome maybe that the high rate of infant death in the country due to poor state of healthcare services has contributed significantly in reducing the country's population growth. This finding is in line with that of Nyoni (2018) which stressed that infant mortality rate decreases population growth in Pakistan.

Life expectancy from birth has a negative relationship with population growth rate in Nigeria. This imply that the low life expectancy in Nigeria due to low level of nutrition and health leads to short life span which result to decline in the country population. This outcome conforms to that of Nyoni (2018) which states that life expectancy rate reduces population growth in Pakistan.

Maternal mortality rate from the result has a negative relationship with population growth rate in the long run. This finding maybe that the high rate of maternal deaths caused by inadequate medical facilities and lack of qualified medical personnel's has contributed to decline in the country's

population. This finding do not conform to that of Sing et al (2017) which revealed that maternal mortality rate increases population growth in India.

Per capita income from the result has a positive relationship with population growth rate in Nigeria. This maybe that the income per head in the country has judiciously used by the inhabitants of the country leading increase in investment and income, hence, leading to more marriages and more children. This finding conforms to that of Nyoni (2018) which indicated that per capita income increases population growth in Pakistan.

Total fertility rate from the result is positively related with population growth rate. This outcome may be due to high rate of early marriage, low usage of contraceptives, lack of education of the girl child, among others which leads to increase in the number of new born children in the country leading to increase in the country's population. This finding agrees with that of Nyoni (2018) which indicated that total fertility rate increases population growth in Pakistan.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The study examined determinants of population growth in Nigeria from 1980 to 2018. It is concluded from the findings that all the variables conform to apriori expectation. Infant mortality rate has a negative and insignificant relationship with population growth rate in the long run, life expectancy at birth has a negative and insignificant relationship with population growth rate in the long run, maternal mortality rate has a negative but significant relationship with population growth rate in the long run, per capita income has a positive and significant relationship with population growth rate in the long run and total fertility rate has a positive and significant relationship with population growth rate in the long run.

B. RECOMMENDATIONS

Based on findings in this study, the following recommendations are offered:

- ✓ The federal government should prioritized family planning to prevent unintended pregnancy leading to fewer births per women.
- ✓ The government should promote education of the girl child in order to avert early marriage and child births leading to lower fertility in women.
- ✓ Furthermore, civic education of the populace on the danger of increasing population should be encouraged at all levels in the country.

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