Impact Of Population Growth and Poverty on Education in Nigeria

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Abstract
The study examined the impact of population growth and poverty on education in Nigeria from 1981 to 2023. To achieve the objectives, annual time series data on Human Development Index (HDI), Population Growth Rate and Poverty were collected from secondary sources. The dependent variable was education which was proxy by expected years of schooling. The independent variable – population growth (was disaggregated into rural and urban population growth rate) and poverty rate. The E-views 12 Statistical Software was employed to analyze the data empirically. The Unit root test was adopted to test the stationarity of variables. The Unit root test shows that expected years of schooling (EYS), Urban population growth rate (UPGR), and poverty rate (PVT) variables evaluated are all stationary after first difference I(1) while Rural population growth rate (RPGR) was stationary at level I(0). The result indicated that that the coefficients of UPGR, RPGR and PVT are all negatively signed and statistically significant in the long-run. It therefore means, UPGR and RPGR negatively affect education in Nigeria. The study recommends amongst others that the Nigerian government should introduce policy that will make it compulsory for working age population who had no formal education to enroll in any government training centre across this country to learn a trade. This will help reduce level of unemployment and poverty rate in the society.

Key Words: Population growth, Poverty, Education, ARDL, Nigeria

INTRODUCTION

The known ten most populous countries in the world are; China, India, United States, Indonesia, Brazil, Pakistan, Nigeria, Bangladesh, Russia and Mexico (World Population, 2021). This suggests that Nigeria is the 7th most populous country in the world. Population growth has not been to the nation's advantage and has also led to unemployment rate hitting 30.7 percent (National Bureau Statistics, 2021).

Friedberg and Hunt cited in Sarker, *et al.* (2016) mentioned that population growth and urbanization go together, and economic development is closely related with urbanization. Additionally, Bloom, *et al.* (2008), however, no evidence that urbanization level affects economic growth rate. The reported presented by the researchers highlighted the importance of reassessing the relationship between urbanization and economic growth, and makes us rethink profoundly the popular ideas and practice of accelerated urbanization in developing countries.

On the contrary, rural populations do not follow the exact same dynamics as urban populations, as usually the underlying demographic determinants are different between these population groups. The first big difference lies in fertility, which tends to be considerably higher in rural areas. The preferred indicator of fertility, the total fertility rate (TFR), rarely gets calculated separately for urban and rural populations. In some cases, nuptiality at earlier ages in rural areas plays an important role, but more generally, access to health services, including reproductive health services

are less accessible in rural areas; and education levels, which have consistently been found to be negatively correlated with fertility (Scholnik and Chackiel, 2004) for example tend to be lower in rural areas.

The NBS (2021) report above suggests that health of an economy is determined by its gross domestic product (GDP) and other key economic indicators. A country with good infrastructure, improves literacy amongst the populace, unrestricted access to standard health care, poverty reduction and other parameters which are elements of economic development. It is against this background that this study is set to investigate population growth, poverty and Nigeria's economic development.

Despite these policies and programs put in place by the Nigerian government, population growth in Nigeria has been on the increase over the years or for the past decade. Available statistics shows that population growth in Nigeria have been on the increase over the past four decades, it increased from 75,440,500 in 1981 to 95,212,450 in 1990 to 122,283,800 in 2000 to 158,503,200 in 2010 and to 206,139,589 in 2020 (CBN, 2020), with all these policies and programmes put in place by various governments and the increase in population growth in the country, it is expected both in theory and practice that it should transform the Nigerian economy. But a cursory look at the Nigerian economy as a whole indicates that all is not well with the economy. Ogbonna, (2012) posit that the Nigerian economy has been bedeviled by perennial underdevelopment, inequality, unemployment, poverty, increased debt burden resulting from poor energy supply and power outages, systematic collapse of industries and infrastructures, lack of proper turn around maintenance in the oil and gas industries, high rate of corruption, militant insurgences, criminal activities etc. This study maintained that the economy is really faced with poor human developmental and economic indices as evidenced by high rate of perennial and persistent inflation, fluctuating and deficit balance of payment position, low per capita income, poor income distribution, GDP and sustained impoverishment. Tagem (2017) has it that mismanagement of abundant natural, human and material resources, insatiable greed and lust for excessive wealth; corrupt practices at all levels and political banditry have been the bane of Nigeria's economic progress.

The persistence of these problems in spite of the various policy measures adopted by various governments to strengthen the economy and inconclusive debate regarding the actual effect of population growth on the development of the Nigerian economy makes it imperative to empirically provide answers to some pertinent questions.

LITERATURE REVIEW
Conceptual Clarification
Population Growth
The "population growth rate" is the rate at which the number of individuals in a population increases in a given time period, expressed as a fraction of the initial population. Specifically, population growth rate refers to the change in population over a unit time period, often expressed as a percentage of the number of individuals in the population at the beginning of that period.

Population growth is the increase in the number of individuals in a population. Global human population growth amounts to around 83 million annually (World Population Prospects, 2017) or 1.1% per year. The global population has grown from 1 billion in 1800 to 7.8 billion (World Population, 2017). It is expected to keep growing, and estimates have put the total population at 8.6 billion by mid-2030, 9.8 billion by mid-2050 and 11.2 billion by 2100 (World Population

Prospects, 2017). Many nations with rapid population growth have low standards of living, whereas many nations with low rates of population growth have high standards of living.

Poverty Rate

Poverty has no clear cut or universal accepted definition. Poverty is a state where an individual is not able to cater adequately for his or her basic needs of food, clothing and shelter (Kpelai, 2013). However, Eboh & Uma (2010), view poverty as "a lack of command over basic consumption needs", which means that there is an inadequate level of consumption giving rise to insufficient food, clothing or shelter, and moreover, the lack of certain capacities such as being able to participate with dignity in society. Genyi (2007), agrees that: Poverty has various manifestations including lack of income and productive resources sufficient to ensure sustainable livelihoods, hunger and malnutrition, ill-health, limited or lack of access to education and other basic services, increase morbidity from illness, homelessness and inadequate housing, unsafe environment, social discrimination and exclusion. It is also characterized by a lack of participation in decision and in civil, social and cultural life.

Literacy (Expected years of Schooling)

Essien (2005), maintains that literacy is concerned with the ability to read and write in a language. A literate person is, therefore, someone who is able to read and write in a language or languages. Thus, the standards for what level constitutes 'literacy' differ from society to society. Literacy has also been expanded to include skills in computer, basic numeracy, sound, still and moving images and graphical elements in digital based communication. Also, it is reported that the National Council of Teachers of English (NCTT) and the International Reading Association have added "visually representing" to the list of communicative competences that constitute literacy. The condition whether one has achieved a certain degree of literacy differs and is dependent on who is defining the standard and why. Functional literacy achieved through basic education, is the key to a nation's ability to develop and achieve sustainable developmental targets. Functional literacy is an intellectual equipment for an individual to enable him or her not only literate, but also perform other tasks that are of benefit to him/or her and to the society in which he or she lives (Asiedu and Oyedeji, 1985). It enables people to use their acquired knowledge to promote activities for economic gains or academic performance or gains. It is in the light of the importance of functional literacy to the individual and societal emancipation that the teaching of it in a multilingual environment like, Nigeria attracts a lot of attention (Etor, 2002).

The higher the level of literacy a person has the more his or her ability to earn. Street (1995), argues that the socio-economic level of a family has more to do with a child's literacy level and that literacy levels have to do with income. The higher the family income the more likely it is that the children would have a high literacy level, in other words, though illiteracy does not cause poverty, poverty does cause illiteracy.

Literacy enhances the status of women, reduces population rate, enhances environmental protection and generally raises the standard of living of individuals and societies. Literacy can improve agricultural productivity.

Between 15 to 20 years of age is 9.3% for males while that of females in the same age is 13.5%. Literacy is a good indicator of educational achievement of nations and may also be a better indicator of enrolment in schools, since it usually reflects a minimal level of successfully completed schooling.

Theoretical Review
The Malthusian Theory of Population
Thomas Robert Malthus enunciated his views about population in his famous book, Essay on the Principle of Population as it affects the future improvement of society, published in 1798. Malthus revolted against the prevailing optimism shared by his father and Godwin that a perfect state could be attained if human restraints could be removed.

Malthus objection was that the pressure of increasing population on food supply would destroy perfection and there would be misery in the world. Malthus was severely criticized for his pessimistic views which led him to travel on the continent of Europe to gather data in support of his thesis.

He incorporated his researches in the second edition of his Essay published in 1803. The Malthusian theory explains the relationship between the growth in food supply and in population. It stated that population increases faster than food supply and if unchecked leads to vice or misery. The Malthusian doctrine is stated as follows:

(i)   There is a natural sex instinct in human beings to increase at a fast rate. As a result, population increases in geometrical progression and if unchecked doubles itself every 25 years. Thus starting from 1, population in successive periods of 25 years will be 1, 2, 4, 8, 16, 32, 64, 128, 256 (after 200 years).

(ii)   On the other hand, the food supply increases in a slow arithmetical progression due to the operation of the law of diminishing returns based on the supposition that the supply of land is constant. Thus, the food supply in successive similar periods will be 1, 2, 3, 4, 5, 6, 7, 8, and 9 (after 200 years).

(iii)   Since population increases in geometrical progression and the food supply in arithmetical progression, population tends to outrun food supply. Thus, an imbalance is created which leads to over-population. This is depicted in Figure 1.
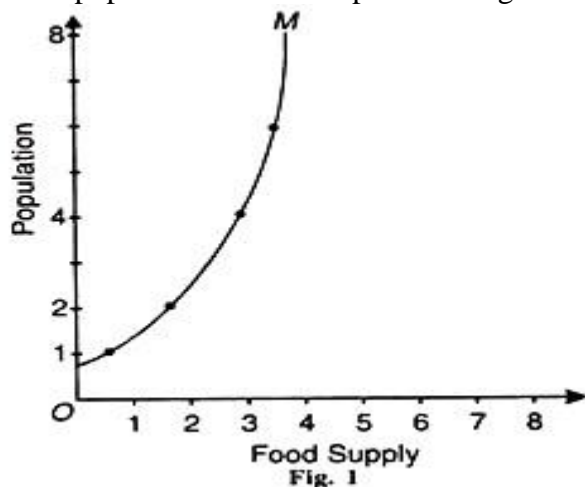
Fig 2.1: The Malthusian Population Curve

The food supply in arithmetical progression is measured on the horizontal axis and the population in geometrical progression on the vertical axis. The curve M is the Malthusian population curve which shows the relation between population growth and increase in food supply. It rises upward swiftly.

(iv)   To control over-population resulting from the imbalance between population and food supply, Malthus suggested preventive checks and positive checks. The preventive checks

are applied by a man to control the birth rate. They are foresight, late marriage, celibacy, moral restraint, etc.

If people fail to check growth of population by the adoption of preventive checks, positive checks operate in the form of vice, misery, famine, war, disease, pestilence, floods and other natural calamities which tend to reduce population and thereby bring a balance with food supply.

According to Malthus, preventive checks are always in operation in civilized economies, for positive checks are crude. Malthus appealed to his countrymen to adopt preventive checks in order to avoid vice or misery resulting from the positive checks.

Empirical Review

Nurudeen and Ibrahim (2014) examined the relationship among poverty, inequality and economic growth in Nigeria for the period 2000 to 2012. The study used both the Auto-regressive Distributed Lag (ARDL) and the granger causality techniques. The ARDL co-integration estimate showed no evidence of a long run relationship among the variables while the causality estimate showed unidirectional causation from economic growth to poverty rate in Nigeria.

Fosu (2015) examined the relationship among economic growth, inequality and poverty in Sub-Saharan Africa (SSA). The study used recent World Bank data and observed that recent progress on poverty reduction has been considerable, in contrast to the 1980s and 1990s period. Specifically, the study noted that income growth was the main driver of poverty reduction in SSA. However, the study acknowledged that from a global perspective, the low levels of growth inhibited the effectiveness of growth and inequality improvements in reducing poverty in many African countries.

Akanbi (2016) examined the link among economic growth, poverty and inequality for a group of nine South African provinces over the period 1995 to 2012. In the study, poverty was proxy by income poverty and non-income poverty while inequality was proxy by income inequality, education inequality and land inequality. Evidences from the study showed the existence of along-run relationship among growth, poverty and inequality. The causality estimate showed a unidirectional causation from income inequality to economic growth while no causation was observed from economic growth to income inequality. More so, unidirectional causation was observed from income poverty to income inequality while a unidirectional causation was equally observed from income inequality to non-income poverty.

Ojo (2021) examined the link between population growth and poverty rates in the developing countries of Africa. Poverty in Africa is a growing menace to standard of living and economic wellbeing of the people and this is visible and concentrated in fewer countries than others. Five of the ten poorest countries in the world are in Africa, and of the top ten countries, three are African countries. The average per capita income of these countries is the least in the world, which is an indicator of the standard of living. While some African countries have made gains in population control, others have put in place strategies and institutions aimed at reducing it. There is evidence of a link between population growth and poverty in African countries, and it is suggested that governments should provide more resources and policy interventions aimed at population reduction.

METHODOLOGY
Research Design
The study adopted the Ex-post facto research design to examine the relationship between population growth, poverty and education in Nigeria. Ex-post facto study or after-the-fact research is a category of research design in which the investigation starts after the fact has occurred without interference from the researcher.

Model Specification
The model specification for this study aligned with the work of Ali. *et al*. (2018) with further modification. Ali, *et al*. (2018) who analyzed the nexus between population, poverty and education in some selected developing countries between 2002 and 2015 model was:

EYS = *f*(RPGR, UPGR, PVT)   3.8

EYS = Expected Years of Schooling
RPGR = Rural population growth rate
UPGR = Urban population growth rate
PVT = poverty rate

For the purpose of estimation, it is necessary to re-write the model in the form of equation as;

$$EYS = \beta_0 + \beta_1 RPGR_t + \beta_2 UPGR + \beta_3 PVT_t + \mu_{1t}$$ 3.9

Where: EYS = Expected Years of Schooling
β_0 = Constant term
β_1, β_2, β_3 = the coefficient of rural population growth, urban population growth and poverty rate to be determined.
μ_{1t} = error or stochastic term.
β_1, β_2, > 0 $\beta_3 < 0$ = the apriori expectation.

Table 1. Philip Perron Unit Root test

Variables	Level	Critical Value	1st Diff.	Critical Value	Decision
EYS	-0.525985	-2.963972	-14.72402	-2.967767	I(1)
PVT	-2.809585	-3.529758	-7.903391	-3533083	I(1)
RPGR	-4.447963	-3.529758			I(0)
UPGR	-1.861027	-2.938987	-5.738266	-2.941145	I(1)

Source: *Author's Computation using E-views 12*

Table 1, shows the Philip Perron Test. Going by the preposition of Jenkin and Box (1970), the Variables that are not stationary at levels shall be made stationary after first difference. Expected years of school, Urban population growth rate and poverty rate were stationary after first difference while Rural population growth rate was stationary at level.

Empirical Analysis of EYS Model
Bound Test Co-integration Result for EYS Model

Table 2, ARDL Bound Co-integration test model EYS

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	3.730500	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

The bound test of cointegration result presented in Table 2, shows that the calculated f-statistic value of 3.730500 is greater than the theoretical critical value for the upper bound I(1) at 5 percent level. This means that there is a co-integration; hence, a long run relationship exists between PVT, RPGR, UPGR and EYS within the study period. Since there is existence of long run relationship among the variables, both short run and long run estimate of the model was conducted using the ARDL approach.

Table 3, Long Run Estimation Results for Dependent variable EYS
ARDL Long Regression Estimate

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PVT	-0.023353	0.010756	-2.171200	0.0444
RPGR	-3.578183	0.285205	-12.54599	0.0000
UPGR	-0.762347	0.280666	-2.716208	0.0147
C	18.23587	1.550751	11.75938	0.0000

EC = EYS - (-0.0234*PVT -3.5782*RPGR -0.7623*UPGR + 18.2359)

Source: *Author's Computation using E-views 12*

From Table 3 the result, is the long run model of EYS, The result reveals that all the independent variables in the model exert negative significant influence on EYS. The result revealed that PVT, RPGR and UPGR has negative coefficients with p-value less than 0.05 alpha.

Short Run Estimation Results for Model 3 (Dependent variable EYS)
Table 4 ECM Regression Estimate of EYS Model

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ECM Regression Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.08086	3.044280	4.953834	0.0001
D(PVT)	-0.014212	0.005608	-2.534155	0.0202
D(PVT(-1))	-0.014235	0.005777	-2.464240	0.0234
D(RPGR)	-0.382234	2.928623	-0.130517	0.8975
D(RPGR(-1))	6.104152	3.210564	1.901271	0.0725
D(UPGR)	0.138256	1.324262	0.104402	0.9179
D(UPGR(-1))	2.507567	1.391856	1.801600	0.0875
CointEq(-1)*	-0.859543	0.176046	-4.882487	0.0001
R-squared	0.610808	Mean dependent var		0.113333
Adjusted R-squared	0.486974	S.D. dependent var		0.425671
S.E. of regression	0.304890	Akaike info criterion		0.685448
Sum squared resid	2.045076	Schwarz criterion		1.059101
Log likelihood	-2.281723	Hannan-Quinn criter.		0.804983
F-statistic	4.932473	Durbin-Watson stat		2.318618
Prob(F-statistic)	0.001800			

Source: *Author's Computation using E-views 12*

Table 4. shows that the calculated Adjusted-R square is 0.486974, indicating that the regressors in the model account for approximately 47.0 percent of the total fluctuation in POR. The remaining 53.0 percent are accounted for by forces which are exogenous to the model but covered by the stochastic term. Also, the result validated the entire regression model to be of good fit. The F-statistics of 4.932473 with a p-value of 0.001800 which is less than 5% (P<0.05) level of significance, indicated that the model is properly specified. The result of the error correction model (CoinEq(-1)) is well specified and the diagnostic statistics are good. The ECM variable has the correct apriori sign and also statistically significant. The speed of adjustment of -0.859543 shows the level of convergence of the variables. In particular, about 86.0 percent of disequilibrium or deviation from long run of EYS in the previous period is corrected in the current year, since the data employed are yearly data. Also, the DW statistics value was 2.318618, meaning that there is absence of serial autocorrelation in the model.

Furthermore, D(PVT) was negative and statistically significant in explaining the variations in EYS. A unit increased in EYS decreases the EYS by 2.0%. Also, D(PVT) in its 1 lagged period was negative in explaining the fluctuation in EYS in Nigeria. The result revealed that a unit increase in PVT decreases the 1.4% in the 1 lagged period by approximately 1.4%, this influence is statistically significant.

However, D(RPGR) and D(RPGR(-1)) was insignificant in explaining the variations in EYS for the period of study. The result revealed that D(RPGR) has a coefficient of -0.382234 and p-value of 0.8975 which ia more than 5% while D(RPGR(-1)) has a coefficient of 6.104182 with p-value of 0.0725 indicating that the variables is insignificant in predicting the fluctuation in EYS. In addition, D(UPGR) and D(UPGR(-1)) was statistically insignificant in explaining the variations in EYS.

Explanation of EYS Model
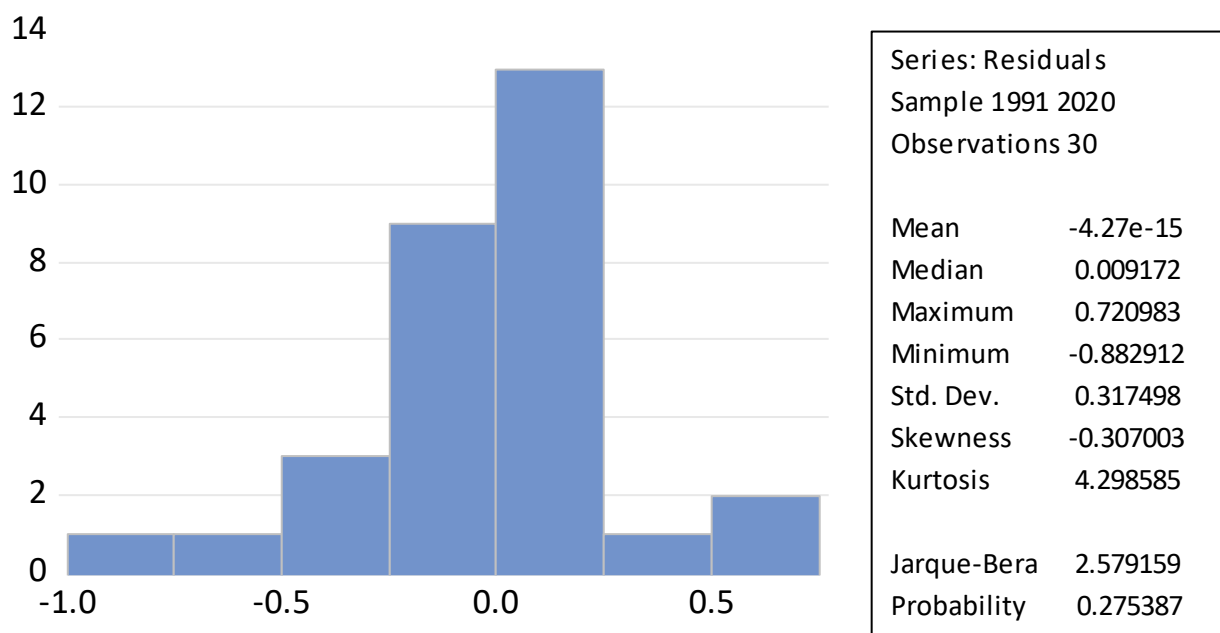## Population Growth, poverty and Education in Nigeria

Population growth was disaggregated into rural and urban population growth rate while education was proxied by expected years of schooling. The result of the analysis reveals that in the long-run, PVT, RPGR and UPGR significantly impact on education in Nigeria. The result revealed that the coefficient of PVT in the long-run was -0.023353 with a p-value of 0.0444 which is significant at 5%. The implication is that for every 1 unit increase in PVT there's a corresponding decrease in expected years of schooling. Also, RPGR with a coefficient of -3.578183, and a p-value less than 5%, this implies that a unit increase in RPGR will decrease EYS in Nigeria. In the same vein, the negative coefficient of UPGR shows that a unit increase in UPGR decreases EYS by 76.2% in the long-run.

In the short-run, only D(PVT) and D(PVT(-1)) was significant in predicting the changes in EYS. The result revealed that a unit increase in PVT result in 1.4% decreases in EYS while a unit increase in PVT in the period lagged will result in 1.4% decrease in EYS. This is an indication that population growth and poverty negatively affect education in Nigeria. The finding of the study is in line with Nwosa and Ehinomen (2020) who reported a no significant relationship between poverty and economic development. However, the finding run contrary to that of Akanbi (2016) and Nakabashi (2018) who found a significant influence of poverty on economic development.

Diagnostic Testing of EYS Model

The diagnostic test is conducted to determine if the series fulfill the assumption of normality of distribution, autocorrelation (Breusch-Godfrey Serial Correlation LM Test) and heteroscedasticity (Breusch-Pegan-Godfrey Test). The result of the diagnostic test is presented below.

Figure 1. Residual Diagnostic Test Analysis for EYS Model

Series: Residuals	
Sample 1991 2020	
Observations 30	
Mean	-4.27e-15
Median	0.009172
Maximum	0.720983
Minimum	-0.882912
Std. Dev.	0.317498
Skewness	-0.307003
Kurtosis	4.298585
Jarque-Bera	2.579159
Probability	0.275387

Source: *Author's Computation using E-views 12*

Normality test is essential to ascertain the distribution of the data set in the model. It could be seen in figure 1, that the null hypothesis that the variables are normally distributed cannot be rejected since the probability value of Jarque-Bera is greater than 0.05, at 0.275387. This means that the residuals are normally distributed and has not violated the assumption of normality. The histogram-normality test further showed that the model is largely skewed to the left given the skewness statistic value of -0.317498 and possessed a heavier tail than the normal distribution given a kurtosis statistic value of 4.298585.

Serial Correlation LM Tests of the Model
One of the assumptions of the ARDL model must not violate is no serial correlation of the residuals. If they become serially correlated, parameter estimates are still linearly unbiased and consistent, but they are no longer having minimum variance as expected. The Lagrange Multiplier (LM) version is applied in this study.

Table 4.1 Residual Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.054473	Prob. F(2,21)	0.9471
Obs*R-squared	0.154834	Prob. Chi-Square(2)	0.9255

The null hypothesis of no serial correlation is rejected in the LM testing approach, if the probability value (p-value) is smaller than the level of significance which 0.05. From the result in Table 4.17 the null hypothesis cannot be rejected at 5% level of significance because the LM-Stat corresponding to 2 lags used in this study is 0.054473 and the p-value is 0.9471 (94.7%) which is more than 5%.

Table 4.2: The Heteroscedasticity Test Result for Model 3 (EYS)

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.570610	Prob. F(10,24)	0.1757
Obs*R-squared	13.84456	Prob. Chi-Square(10)	0.1802
Scaled explained SS	10.41144	Prob. Chi-Square(10)	0.4052

Source: *Author's Computation using E-views 12*

The null hypothesis of no heteroscedasticity cannot be rejected if the p-value of the Breusch – Pagan statistic is greater than the specified 5% levels of significance. The result in Table 4.18 Shows p-value greater than 0.05 indicating our model is devoid of heteroscedasticity. **Stability Diagnostic Test**

4.3 Cusum of Square Test
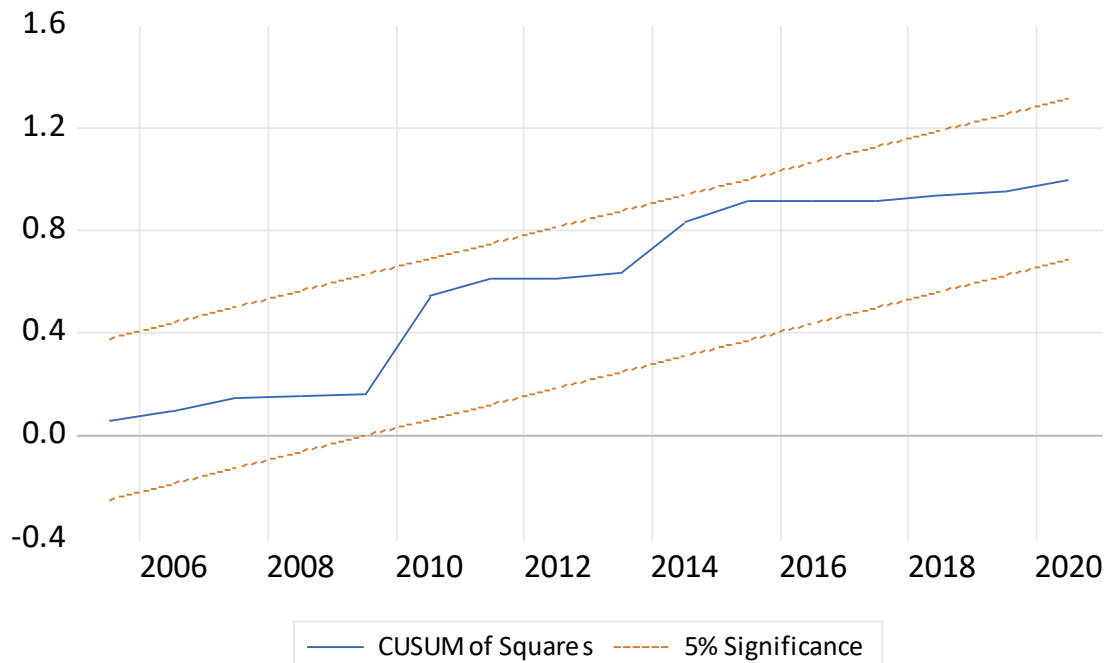
Figure 4.12 *Plot of Cumulative Sum of Square Recursive Residuals (CUSUMQ)*
From the figure above, the dotted red lines also represented the critical bounds. The figure also shows that the sum of squares of the recursive residuals of the EYS is relatively stable especially for the period of examination. The results imply that the null hypothesis of no stability of the short-run EYS can be rejected at 5% significance level.

Conclusions
Population growth in less developed countries like Nigeria is linked to many problems, including poverty, hunger, high infant mortality and inadequate social services and infrastructure (transportation, communication etc.) Population growth may intensify the rate of poverty which may in turn affect savings and investment. Poor savings and investment affects economic development while economic development in turn affects the population growth. This is an indication that population growth, poverty and economic development are linked. This study is to further explore the linkage in the Nigerian context. The study findings indicated that a long-run relationship exists among the variable, the independent variables also have significant impact on the dependent variable. It is therefore concluded that population growth, poverty rate has negative significant impact on education in Nigeria within the study period.

Recommendations
The recommendations for this study include;
i.   Government should introduce policy that will make it compulsory for working age population who had no formal education to enroll in any government training centre across this country to learn a trade. This will help reduce level of unemployment and poverty rate in the society.

ii.   Governments should raise minimum wage, create more employment opportunities, invest in quality and universal education, expand health and medical care, and provide easy access to the political process to reduce the poverty rate in the country.

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