
Population Growth and Development in Nigeria: An Overview

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Abstract

The paper is on population growth and development in Nigeria. The paper adopted four variables (Income, Education, Health, Employment) as explanatory and population growth as explained variables. Time series data from 1970 to 2011 were empirically tested with ordinary least square (OLS) used for analysis. The study found that, there is a positive and bidirectional relationship between population growth and development in Nigeria, meaning that they granger causes each other. The study also found that per capita Income and (YPC), Life expectancy at Birth (Lifbirt) impact positively on population growth while Adult illiteracy and unemployment (unemrate) rates impacted negatively on population growth. Based on the findings the study recommended that government at all levels should pay more attention on the improvement of development indicators which will improve livelihood. Also there is need to evolve policies and programmes that will enhance industrialization, reduce unemployment and increase per capita income.

Introduction

Population is the total number of people who live in a particular area, city or country. According to American Heritage Dictionary (n.d), the word “population” refers to the total number of inhabitants constituting a particular race, class or group in a specified area. In the past, population was seen as a source of strength to defend one's territory and also as labour force for increased productivity. This is predicated on the premise that labour was the major source of production, thus nations clamoured for increased population. But today, given the enormous breakthrough in science and technology as the major source of production, the quest for population increase has declined. Thus, trends in population growth among nations of the world are declining.

Population growth rate is the rate at which the number of individuals in a population increases in a given period as a fraction of the initial population. Specifically, population growth rate refers to the change in population over a unit time period. It is often expressed as a percentage of the number of individuals in the beginning of that period. This can be mathematically expressed as:

$$\text{Pop growth rate} = \frac{P(t_2) - P(t_1)}{P(t_1)} \quad \text{---} \quad (1)$$

$P(t_1)$ = Population at time 1 or the beginning of a period for consideration.

$P(t_2)$ = Population at time 2 or a time period later than time 1 which might be a year or more.

Population growth rate (ratio) as used in equation 1, can be positive or negative. A positive growth implies that there is an increase in the number of birth and immigration over death and emigration. While a negative growth rate indicates a decrease in population, implying that the death rate and emigration outnumbered birth rate and immigration. Such situation can occur in cases of conflicts or war in which a lot of people die or people are forced to move out of their countries. Liberia, Sierra-Leone, Rwanda, Democratic Republic of Congo are ready examples within Africa, Oyekemni (2008).

By the beginning of the twenty first century, the global population had exceeded 6 billion; it took just 12 years for the population to increase from 5 to 6 billion. Developing countries make up 80 percent of the world population. 61 percent of the global annual accounted growth of population is to Asia alone, driven by the population giants, China and India, (Vandana and Robert, 2008).

The world trend in the annual average population change has been declining since 1985 till date, Africa, Europe, South America and U. S. A indicated declining rate as shown in the table 1.1. The declining population rate has been attributed to several factors which include the use of contraceptives, preference to fewer children, late marriages, birth control legislation and economic factors, (Ekong, 2014).

TABLE 1.1: Annual Average Population Change (%) 1985-2010.

	1985 - 90	1995 - 2000	2005 - 2010
World	1.7	1.4	1.2
Africa	2.8	2.6	2.5
Asia	1.9	1.4	1.2
Europe	0.4	0.0	0.1
South America	1.9	1.5	1.3
U. S. A	1.0	0.8	0.8

Source: Ekong, 2014.

The determinants which bring about change in population are the interaction of fertility, mortality and migration in such a way that is depicted by the equation below.

$$\text{Pop} = (B - D) + (I - E) \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad (2)$$

Where:

B = Birth rate; the number of life birth in a year per thousand of population.

D = Death rate; the number of death in a year per thousand of population.

I = Immigration rate; foreigners migrating into our country.

E = Emigration rate; nationals migrating out of the country to another country.

The expression in equation 2 states that population growth during the one year period is due to birth rate minus death rate plus immigration minus emigration in the designated territory.

Population growth rate whether on the increase or decrease exacts problem. This problem is not a problem of numbers, but a problem of human welfare and development. The growth rate is a factor in determining the changing needs of the people for welfare, (e.g. food, housing, water), infrastructure, (schools, hospital, roads, electricity); resources, (material and human capital). Thus, there is a relationship between population growth and development, this relationship has brought about debate among development economists and other social scientists. While the “orthodox” economists argued that rapid population growth rate has serious economic consequences and that if left unchecked would hinder economic development. Other population

“revisionists” argue that population growth is an essential ingredient to stimulate economic development. Larger populations they argue provide the needed consumers demand to generate favourable economies of scale in production, to lower production cost and to provide a sufficient and low-cost labour supply to achieve higher output levels.

1.1 Meaning of development

The term “development” is used here to describe a process of improvement in the various aspects of the economy and the society as a whole. The improvement is usually shown in the kinds of desirable changes indicated (Akpakpan, 1999).

Thus, according to Akpakpan, 1999, these include:

- Increases in the real output of goods and services i.e. Economic growths;
- Improvement in the productive capacity;
- Improvement in literacy, housing, and health services;
- Reduction in the level of poverty;
- Reduction in the unemployment rate and
- Reduction in the degree of personal and regional inequalities.

This implies that development entails the improvement in people's level of living, their income, health, education, and general well-being.

An Overview of Population Theories

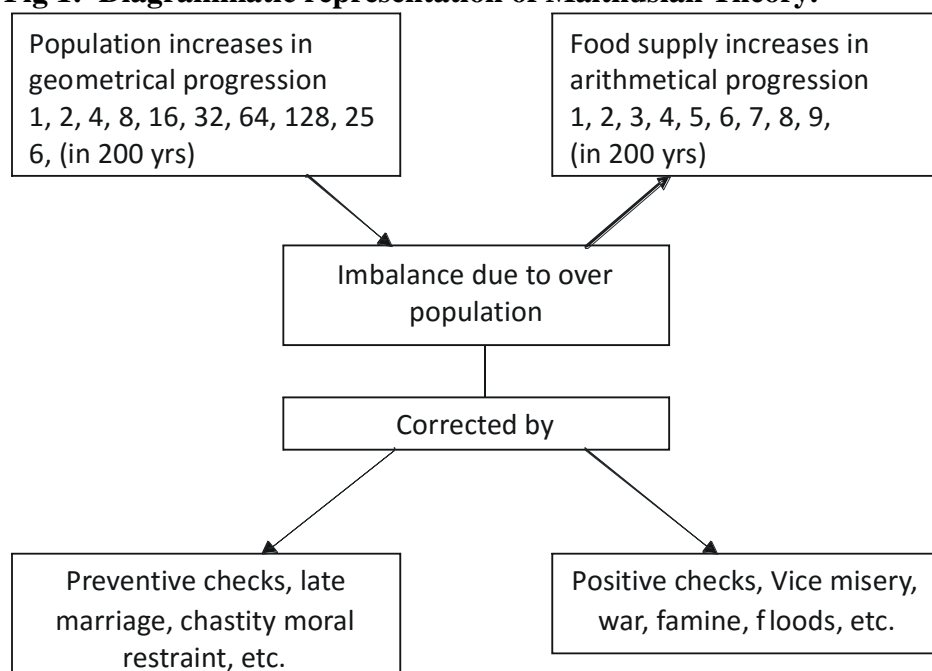
1. Malthusian Theory

Thomas Malthus (1798), postulated that population grows in geometric progression, while the means of subsistence grows in arithmetic progression as observed from the event in England. He said that population would continue to increase at a faster rate than the means of subsistence unless it is curtailed through positive or negative checks. The positive checks include postponement of marriage, and abstinence within marital unions, i.e. family planning, coupled with abstinence from sexual relations before marriage (VandeWalle, 1958). The negative checks include famine, war and pestilence.

For several years Malthus theory was greatly debated. Those who supported Malthus theory pointed to events in mainland Europe in form of waves epidemics and later on wars which wiped out large segment of the population to buttress his argument. The new Malthusians also saw the occurrence of wars in other parts of the world as being largely accounted for by pressure of population on natural resources such as land, water, food and non-renewable resources which man is depleting without plans for replacement (Oyekanmi, 2008).

The opponents of Malthus theory highlighted the discovery of new lands and colonies, which supplied the European countries with raw materials needed in the factories and which gave the metropolitan countries access to improved standards of life hitherto unimaginable. At the same time the colonies provided outlets for out posting of populations that would otherwise have caused population pressure in Europe. Hence, development in fact took place in European countries while their population increased in the 19th and 20th centuries (Oyekanmi, 2008).

Fig 1: Diagrammatic representation of Malthusian Theory.



Source: Adopted from Jhingan and Sharama (2011).

2.1 Demographic Transition Theory

The theory has been propounded by W. S. Thomson and F. W. Netestein. They explained the theory in three stages; Kart Sax's explain the theory in four stages: while C. P. Blackers explained the theory in five stages of population growth.

This study is based on demographic transition theory as stated by Blacker (n.d) Jhingan and Sharma (2011). According to Blacker every country passes through different stages of population, these stages are:

- The high stationary phase marked with high fertility and mortality rates;
- The early expanding phase marked by high fertility and high declining mortality.
- The late expanding phase with declining fertility but with mortality declining more rapidly.
- The low stationery phase with low fertility balance by equal low mortality; and
- The declining phase with low mortality, lower fertility and an excess of death over births.

First Stage

In this stage, the country is backward and is characterized by high birth and death rates with the result that the growth rate of population is low. People mostly live in rural areas and their main occupation is agriculture which is in a state of backwardness. There are a few simple light and small consumer industries. The tertiary sector consisting of transport, commerce, banking and insurance is underdeveloped. All these factors are responsible for low incomes and poverty of the masses.

Large family is regarded as a necessity to augment the low family income children are an asset to the society and parents. The existence of the joint family system provided employment to all children in keeping with their ages. More children in a family are also regarded as an

insurance against old age by the parents. People being illiterate, ignorant, superstitious and fatalists are averse to any method of birth control.

Children are regarded as God-given and pre-ordained. All these economic and social factors are responsible for a high birth rate in the country. Along with the high birth rate, the death rate is also high due to non-nutritional food with low caloric value, lack of medical facilities and the lack of any sense of cleanliness. People live in dirty and unhealthy surroundings in ill ventilated small houses. As a result, they are disease ridden and the absence of proper medical care results in large deaths.

The mortality rate is the highest among the children and the next among women of child bearing age. Thus, the birth and death rates remain approximately equal over time so that a static equilibrium with zero population growth prevails.

Second Stage

In the second stage, the economy enters the phase of economic growth. Agriculture and industrial productivity increases, and means of transport develops, there is greater mobility of labour, education expands, income increases, people get more and better quality food products, medical and health facilities are expanded, modern drugs are used by the people. All these factors bring down the death rate, but the birth rate is almost stable. People do not have any inclination to reduce the birth of children because with economic growth, employment opportunities increase and children are able to add more to the family income.

With improvements in the standard of living and the dietary habits of the people, the life expectancy also increases. People do not make any effort to control the size of the family because of the presence of religious dogmas and social taboos towards family planning. Of all the factors in economic social institutions, customs and beliefs; As a result of these factors, the birth rate remains at the previous high level with the decline in the death rate and no change in the birth rate, population increases at a rapid rate. This leads to population explosion. This is called an “Early Expanding” (EE) stage in population development.

Third Stage

In this stage, birth rate starts declining accompanied by death rate declining rapidly. With better medical facilities the survival rate of children increases, the country is burdened with the growing population, people adopt the use of contraceptives so as to limit families. Birth rates decline initially in urban areas, with death rate declining rapidly, the population grows at a diminishing rate. This is the “Late Expanding” stage.

Fourth Stage

In this stage, the fertility rate declines and tends to equal the death rate so that the growth rate of population is stationary. As growth gains momentum and people's level of income increases, their standard of living rises. The leading growth sectors expand and lead to an expansion in output in other sectors through technical transformations. Education expands and permeates the entire society. People discard old customs, dogmas and beliefs, develop individualistic spirit and prefer to marry late.

The use of family planning devices become the order of the day as people prefer to go in for car rather than a baby. Moreover, increased specialization following rising income levels and

consequent social and economic mobility make it costly and inconvenient to raise a large number of children. All these tend to reduce the birth rate further which along with an already low death rate brings a decline in the growth rate of population.

Fifth Stage

In this stage, death rates exceed birth rate and population growth declines.

2.2 Empirical Literature

Dao (2012) in his work, population and economic growth in developing countries postulated that the effect of population growth on per capita GDP growth is linearly dependent upon population growth. Based on data from a sample of forty-three developing countries, Deo applied the least-squares estimation technique in a multiple linear regression to get his findings. Dyson (2010) contends that mortality decline is the chief cause of economic development, Mckeown (1976) also argues that the direction of causality should be reversed, i.e. it is the improvement in the standard of living that results in lower death rates. Easterin (1996) and Schofield and Reher (1991) also show that the dire living conditions that came with the industrial revolution and modern economic growth in cities of Europe during the nineteenth Century might have raised mortality rates. On the other hand, evidence from contemporary developing economies tends to show that it is mortality decline that leads to economic growth, as it increases investment in both physical and human capital via increased savings rates and education (see, for instance Bloom and Canning (2001) and Kalemli-Ozcan (2002)).

Furthermore, mortality tends to fall as a result of declines in death rates from infectious diseases. Declines in these diseases tend to bring about an improvement in the nutritional status of children which in turn leads to a fitter future labour force. In fact, Strauss and Thomas (1998) show that healthier workers tend to be more productive.

In pre-transitional societies, relatively rapid population growth almost always resulted in a fall in the standard of living due to the rather severe limits to the technical progress in agriculture or to the fixed supply of land, as pointed out by Malthus (1748;1830[1970]). This prompts Clark (2007) to state that income levels before the nineteenth century could not escape the Malthusian equilibrium due to the very low rate of technological advance in all economies.

However, according to the “neutralist” or “revisionist” view, high population growth rates in developing countries since the middle of the twentieth century have had little effect on per capita GDP growth (see, for instance, Kuznets (1967), Kelley (1988), and Kelley and McGreevey (1994). Simon (1981, 1989) would go as far as suggesting the population growth may have had a positive impact on per capita GDP growth in the long run through improvement of productivity through the contribution of new ideas and the learning-by-doing resulting from increased production volume. Nevertheless, the current consensus is that, as more data become available, rapid population growth has exerted a significant negative effect on economic growth in developing countries (see, for example Birdsall and Sinding (2001), Barrow and Sala-i-Martin (2004), Sachs (2008), Headey and Hodge (2009)).

The recent experience of fertility decline in developing countries in Asia and Latin America has reduced a country's dependency ratio, which then raised the potential for faster economic growth through higher saving and investment levels in both physical capital (such as roads, production facilities) and human capital (such as higher educational attainment and

training for each young worker), particularly for an extended period over which the labor force increases at a faster rate than the pool of dependent people (see, for instance, Higgins and Williamson (1997), Mason (1997), and Bloom and Canning (2001).

Due to this decline, however, eventually this region will experience an increase in its old-age dependency ratio as is the case for both Europe and Japan (see, for instance, Bloom et al., 2009). Population ageing thus may be exercising a negative impact on economic growth.

While many problems such as congestion, pollution, and slum settlements are caused by Urban growth in contemporary developing countries, cities are often described as 'engines' of growth (see, Jacobs 1972, Crook 1997, and Beall and Fox 2009). Cities also provide large and concentrated markets, allowing for economies of scale in the production of manufactured goods as well as low transportation costs. It is in urban areas that firms can better match their demands with the supply of skills, while the returns to infrastructure such as roads, port facilities, and electricity grids are greater due to the concentration of industries and firm. Fox and Dyson (2008) analyze international data for the period since 1975 and find that urban growth has been positively associated with per capita GDP growth.

3.1 Population in Nigeria

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); It is the most populous nation in sub-Saharan Africa and the tenth most populous in the world. However, the composition of this population is mainly in the youthful category with 41% being children of aged 0 - 14 years and a dependency ratio estimated at 76%. 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).

Age Cohort	2006 Population	Percentage
0 - 14 years	58,736,297	41.83
15 - 29 years	40,545,924	28.87
30 - 59 years	34,162,522	24.32
60+	6,987,047	4.98
Total	140,431,790	100

Source: National Population Commission (2006).

Table 2: indicates very high dependency on the working population of 30 - 59 years. From the table aged 0 -14 years are children from birth to basic 3 in educational level, 15 -29 years are those in senior secondary to tertiary institutions given Nigeria education policy. While those in 60+ are retired civil servants and aged people. This implies that about 76% of the total populations in Nigeria are dependent on the working population estimated to be at 24%.

Table 3: Selected Demographic Indicators (1950 - 2030)

Demographic Indicators	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
Population																	
Midyear population (in thousands)	31.7 97	35.9 53	41.5 47	48.0 64	55.5 68	64.4 22	74.8 21	84.8 89	96.6 04	109. 465	123. 179	137. 495	152. 217	167. 271	182. 344	197. 223	211. 776
Growth rate (percent)	(NA)	2.9	2.9	2.9	2.9	3.0	3.1	2.5	2.6	2.4	2.3	2.1	2.0	1.8	1.6	1.5	1.4
Fertility																	
Total fertility rate (birth per woman)	(NA)	7.2	7.2	7.2	7.2	7.2	7.0	6.8	6.4	6.1	5.7	5.3	4.8	4.4	3.9	3.5	3.2
Crude birth rate (per 1,000 population)	(NA)	49	49	49	49	49	48	46	44	43	42	39	36	33	31	28	26
Mortality																	
Life expectancy at birth (years)	(NA)	43	43	44	44	44	45	45	45	45	45	45	47	49	51	52	54
Infant mortality rate (per 1,000 births)	(NA)	143	138	134	129	125	121	117	113	110	107	100	93	86	79	72	65
Under 5 mortality rate (per 1,000 births)	(NA)	244	240	236	232	229	225	222	219	217	210	194	177	160	143	128	113
Crude death, rate (per 1,000 population)	(NA)	21	21	21	20	20	20	19	19	19	19	18	16	15	14	13	12
Migration	(NA)																
Net migration rate (per 1,000 population)	(NA)	1	1	1	1	1	3	-2	-0	-0	-0	-0	-0	-0	-0	-0	-0
Net number of migrants (in thousands)	(NA)	40	40	53	43	94	233	-147	-15	-15	-15	-15	-15	-15	-15	-16	-15

NA Not = Available

Source: U. S. Census Bureau, International Data Base: Retrieved March 21, 2014.

From <http://www.census.gov/ipc/www/idb/country.php>

Table 3 above shows that the population of the nation has grown steadily from about 32 million in 1950 to about 152 million in 2010, a period of about 60 years. In another 20 years, the population would rise to about 211 million people, although the growth rates would have declined to just about 1.4 percent per annum. The rapid growth could be attributed to the huge gap between mortality and fertility as shown in the table 3. Of particular interest is the decline of

the TFR from 7.2 children per woman in 1950 to 4.8 in 2010. In another 20 years, this is projected to drop to 3.2 children per woman. The life expectancy is an indicator of the people's standard of living. In 1950, the life expectancy was as low as 43 years. This rose to 47 years in 2010 and there are indication that it will further rise in years to come. However some studies had estimated that the average life expectancy had risen to 54 years in the late 1990s but declined slightly due to the HIV/AIDS scourge in the country. The table also shows that net migration contributes very little to change in population in Nigeria, Oyekanmi (2013).

The problems identified with migration in the country including the emigration of able bodies' young graduates who seek the Golden Fleece in other countries as well as experienced professionals who move to the already developed nations of Western Europe and North America, and of recent, the oil rich Arab countries.

The arguments about the relationship between population and development have been generating debates globally. It has been asserted by some scholars that population and development are inversely related. In other words, as the number of people in a defined territory increases, the means of providing for them become constrained, thus leading to a decline in the standard of living of the average person all other things being equal, (see, Dao 2012, Todaro and Smith 2011, Headey 2009 and Ahuja 2008).

Other scholars (Kuznets, 1967, McGreevey, 1994) are of the view that, there is a positive relationship between population growth and economic development. They stress that population growth leads to increase in labour force which is an essential productive resource, adding that increasing a productive resource population growth will help in producing more output.

Model specification

The study adopted the model.

Population growth = f (Development)

Where

Development = f (Income, Education, Health, Employment)

Therefore,

Population growth = f (income, education, health, employment)

Where

POP = Population Growth Rate

Income = Per Capital Income (Ypc) = GDP/POP

Education = Illiteracy Rate (ILLTRATE)

Health = Life Expectancy at Birth (LFBIRTH)

Employment = unemployment rate (UNMRATE)

Therefore:

POP = f(Ypc, ILLTRATE, LIFBIRTH, UNMRATE) --- --- 4.1

Setting eqn. 4.1 in econometrics form

Pop = $\alpha_0 + \alpha_1 Y_{pc} + \alpha_2 ILLTRATE_t + \alpha_3 LIFE\ BIRTH_t + \alpha_4 UNMRATE$ -- 4.2

Where;

α_0 = Autonomous population

$\alpha_1 - \alpha_3$ = Coefficient of the proxies

U = Error term (mean and variable assumed constant)

The variables YPc, ILLTRATE, LIFE BIRTH AND UNMRATE are the explanatory variables, α_0 is the intercept while the parameters α_1 , α_2 , α_3 and α_4 are all elasticity coefficient of

the target variables with respect to development. The signs and magnitude of these parameters will measure the nature of the effect or impact of this development on population. U_i is the error term.

4.1 Model Analysis

To analyze the model, the paper adopted annual time series data over the period 1970 - 2011 for the variables. Ordinary Least Square (OLS) multiple regression and its properties were employed to test relationship and also Granger causality verification.

4.2 Unit Root Test for Stationarity (Augmented Dickey Fuller)

In order to make certain whether the assumptions of least squares procedure exist, we conduct tests of stationarity using the Augmented Dickey Fuller (ADF) and Philip Peron approach, then progress to make certain whether long run relationship (co-integration) exists among the variables. Basically, testing for unit roots in data always precedes co-integration analysis. In testing for the stationarity of the variables, Augmented Dickey-Fuller (ADF) and Philip Peron test are employed to determine the degree of integration of the variables, that is, how many times a variable should be differenced to attain stationarity.

Granger (1969) opines that most time series variables are non-stationary, and using non-stationary variable in model might lead to spurious regression. This is why testing for the existence of unit root is of major interest in the study of time series model and co-integration. The summarized result presented in Table 4.1 below shows that at various levels of significance (1%, 5% and 10%), the variables, per capital income, life expectancy at birth, population growth, adult illiteracy rate and unemployment rate are integrated of order (first difference).

Philip Peron Stationarity Test			Augmented Dickfuller Stationary Test		
Variable	Level	First	Level	First	State
Population Growth	-0.365967	-2.590582	-0.366967	-3.026609	(l)
Per Capital Income	-1.958221	-3.820973	-0.2803003	-4.520844	(l)
Adult Illiteracy Rate	-2.530453	-5.662773	-0.993747	-5.791440	(l)
Unemployment Rate	-1.02451	-6.643882	-0.993747	-5.791440	(l)
Life Expectancy at Birth	-1.460904	-3.590582	-2.4896955	-4.951827	(l)

Computed by the author using eviews 7.1

Thus, since stationarity of the variables has been established, we can now conduct the cointegration test in order to ascertain long-run relationship among the variables.

Cointegration was conducted based on the test proposed by Johansen. According to Iyoha and Ekanem (2002), the analysis of and testing of and testing for unit roots naturally lead to the theory of cointegration, that is we proceed to investigate whether these variables are integrated and whether there is existence of long-run relationship. This, is because cointegration deals with the methodology of modelling non-stationary time series variables (Iyoha and Ekanem, 2002: 225).

Table 4.2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.887094	189.9667	69.81889	0.0000
At most 1*	0.753288	102.7189	47.85613	0.0000
At most 2*	0.506877	46.73760	29.79707	0.0002
At most 3*	0.331082	18.45770	15.49471	0.0174
At most 4*	0.057622	2.373951	3.841466	0.1234

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 4.3: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.887094	87.24781	33.87687	0.0000
At most 1*	0.753288	55.98127	27.58434	0.0000
At most 2*	0.506877	28.27990	21.13162	0.0042
At most 3*	0.331082	16.08375	14.26460	0.0255
At most 4*	0.057622	2.373951	3.841466	0.1234

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by $b^*S_{11}^*b = 1$):

The Trace and Maximum-Eigen Cointegration rank tests are reported in table 4.2 and 4.3 above. A cursory glance at the results reveal that null hypothesis of no cointegration equation is rejected by both tests. While the Maximum-Eigen indicates four cointegrating equation at the 5% percent level, the Trace test indicates four cointegrating equation at both 1% and 5% levels. This is strong evidence from the unit root test conducted. Thus, we reject the null hypothesis that the variables per capital income, life expectancy, at birth, population growth, adult illiteracy rate, and unemployment rate are not cointegrated. The existence of the cointegration implies that there is a long-run equilibrium relationship existing among the variables in the equations. This is in consonance with the unit root tests we had earlier, where all the variables were stationary at first difference. Therefore, as noted by Gujaraty (2004), long run relationships exist among variables when they are stationary at first difference or at the same degree level. Finally, we can now go ahead to confirm these long run relationship among, per capital income, life expectancy at birth, population growth, adult illiteracy rate, and unemployment rate on the traditional regression analysis.

Table 4.4 Granger Causality Tests

Pairwise Granger Causality Tests			
Date: 03/27/14 Time: 14:55			
Sample: 1970 - 2011			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
Ypc does not Granger Cause POP	40	21.2258	9.E-07
POP does not Granger Cause Ypc		2.97786	0.0639
LIFBIRT does not Granger Cause POP	40	0.19798	0.8213
POP does not Granger CauseLIFBIRT		87.3654	2.E-14
ILLTRATE does not Granger Cause POP	40	0.92648	0.4054
POP does not Granger CauseILLTRATE		1.55115	0.2262
UNEMRATE does not Granger Cause POP	40	10.6744	0.0002
POP does not Granger CauseUNEMRATE		3.84776	0.0309

From the above Granger causality test conducted, we conversely reject the null hypothesis and conclude that income proxy by per capital income Granger causes population growth (POP), while in reverse population Granger causes income at 6% level of significance. The second equation shows that there is unidirectional between life expectancy at birth (LIFBIRTH) and population growth in Nigeria under the years of study. The third equation indicates that there is no directional relationship between population growth and adult illiteracy rate (ALILRATE) in Nigeria. This means that neither the population nor adult illiteracy causes each other given the Nigerian experience. The fourth equation indeed records bidirectional relationship between population growth and unemployment. This means that unemployment Granger causes population and the population as well Granger causes unemployment in Nigeria under the years of the study.

Table 4.5

Dependent Variable: LOG (POP)
Method: Least Squares
Date: 03/27/14 Time 11:06
Sample: 19702011
Included Observations: 42

Variable	Coefficient	Std Error	t-Statistic	Prob.
C	16.71758	0.410685	40.70654	0.0000
LOG (Ypc)	0.093145	0.050172	1.856521	0.0714
LIFBIRT	0.031032	0.003544	8.755922	0.0000
ILLTRATE	-0.010484	0.000301	-34.86941	0.0000
UNEMRATE	-0.002885	0.001302	-2.216339	0.0329
R-squared	0.996337	Mean dependent var		18.38139
Adjusted R ²	0.995941	S. D dependent var		0.319036
S. E. of Regr.	0.015286	Akaike info Criterion		-4.842509
Log likelihood	106.6927	Schwarz criterion		-4.635643
F-statistics	2516.027	Hannan-Quinn criteria		-4.766684
Prob (F-statistic)	0.000000	Durbin-Watson stat		0.887363

The short run regression result presented in the above Table 3.5 is estimated and analyzed based on our stated method of analysis. This is done using OLS while observing its assumptions.

R-Squared (R₂): The Rsquared which is also known as coefficient of determination, measures the percentage variation in the dependent variable that is explained by the explanatory variables from our estimated equations, the R-squared adjusted are 99%. This implies that the regression line has a good fit. Hence, we can infer that changes in per capita income, life expectancy at birth, adult illiteracy rate, and unemployment rate explained population growth. The Schwarz criterion and Akaike information criterion are low when compare with the results from other functional forms. The F- statistics which shows the overall goodness of the entire model was significant at both 5% and 10% level. Though the Durbin Watson Statistic is low at 0.887 but this should not be source of worry since the variables are stationary at first difference. Therefore, the short run fluctuations will be corrected in the long run. This means that there will be mean reverting in the long run among population and developmental indicators. The elasticity's of the estimated log-linear model depicting the effects of developmental indicators (per capita income, life expectancy at birth, adult illiteracy rate, and unemployment) rate on the level of population growth in Nigeria are summarized on Table 4.5 above, a perfunctory glance at the estimated long-run result;

Per Capital Income (Ypc): As expected the income proxy by per capita income conform to the apron expectation that income level has positive impact on the population growth in Nigeria under the year of study. This impact is statistically significant at 700 level. This means that when the income level improves, people can take care of the health, live in clean environment and improve general well-being, then mortality will fall with birth rate constant will increase population.

Life expectancy at Birth (LIFBIRT): Also as expected, life expectancy at birth has positive sign to population growth in Nigeria. This shows that life at birth contributes 3% for every 100% annual increases in population growth in Nigeria under the year of the study. This effect or contribution is significant at 1%, 5% and 10% level. It therefore implies that the various health programmes, (immunization, family planning and improve health facility) have impacted positively on people's health hence reducing mortality, and increasing survival age.

Adult Illiteracy Rate (ILLTRATE): The coefficient appeared negative contrary to the theoretical expectation. But this is significant at 1%, 5% and 10% significant level. It therefore implies that in Nigeria as adult illiteracy increases, population, growth decreases.

Unemployment (UNEMRATE): As expected the unemployment influence or explanation to population growth in Nigeria has negative sign and statistically significant at 5% level. This means that for every 100% increase in the population in Nigeria was as a result of 0.28% fall in unemployment rate. This is in conformity with our Granger result in table 4.4 above.

Conclusion

This paper adopted econometrics model and time series from 1970 to 2011 to empirically analyze the relationship between population growth and development in Nigeria. It was observed that the results were more robust when interactive variables are included in the model. The following conclusions were deduced from the study.

1. The effect of development on population growth is positive and conforms with demographic transition theory. It is stronger when interaction terms are included in the statistical model.
2. There is a bidirectional relationship between population growth and development meaning that the Granger causes each other.

Recommendation

Based on the findings, the following recommendations are made:

1. The Government at all levels should pay more attention on the improvement of development indicators which will improve livelihood.
2. Government should provide primary health centres to reduce mortality rate.
3. Stakeholders, NGOs, C. B. Os and F. B. Os should enlighten the populace on the dangers of rapid population growth.
4. More attention should be focused towards the provision of infrastructure, especially the improvement of educational sector to fast track development.
5. There is need to evolve policies and programmes that will enhance industrialization, reduce unemployment and increase per capita income.

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APPENDIX

	Lifbirt	pogp	POP	Grate	GDP	A/Illitrate	unemRa
1970	41.18102439	2.29335925	56131845	6.69	6724.89	89.7	5.4
1971	41.6022439	2.32767167	57453735	5.39	6953.47	89.2	6.6
1972	42.03846341	2.366037184	58829321	5.75	7207.17	89	7.1
1973	42.48617073	2.445047694	60285455	4.85	7509.24	88.3	6.5
1974	42.93987805	2.573480961	61857025	5.41	7911.78	87.7	8.6
1975	43.39758537	2.724678561	63565601	3.09	8321.05	86.1	8
1976	43.85926829	2.886223709	65462979	5.97	8623.2	86.6	5.4
1977	44.31692683	3.008768361	67425439	4.68	8762.16	85.4	6.1
1978	44.76007317	3.048041469	69512236	4.76	8882.17	85.1	5
1979	45.17719512	2.986066511	71619219	4.13	9162.27	84.9	7.4
1980	45.54780488	2.861354554	73698099	2.67	9065.19	81.2	8
1981	45.85241463	2.719175276	75729574	2.96	8800.57	79.5	7.8
1982	46.0835122	2.607001669	77729805	1.54	8588.1	79.1	7
1983	46.23960098	2.539853534	79729313	2.05	8582.5	73.6	8.4
1984	46.32421951	2.533691715	81775217	3.49	8649.93	67.1	10.9
1985	46.34529268	2.567012285	83901572	2.6	8590.37	66.3	6.5
1986	46.31826829	2.607463308	86118446	3.72	8584.44	66	5.1
1987	46.26365854	2.629912984	88412920	3.62	8655.23	64.9	7
1988	46.203	2.63505689	90773617	4.36	8834.84	63.9	5.3
1989	46.14982927	2.616184901	93179760	3.09	9008.05	59.2	4
1990	46.11026829	2.582375822	95617350	2.62	8754.01	58	5.5
1991	46.08695122	2.548396355	98085373	1.2	8705.87	57.7	5.7
1992	46.07495122	2.52368849	100592242	0.16	8650.26	54.4	7.5
1993	46.07282927	2.505819438	103144749	1.1	8620.54	52.8	7.2
1994	46.08556098	2.497092552	105752796	2.04	8806.96	51.4	6.8
1995	46.11407417	2.495283685	108424827	3.71	9083.13	43.6	6.2
1996	46.1578049	2.496937459	111166210	4.49	9282.62	42.1	6.4
1997	46.2245122	2.491147223	113979481	5.08	9483.41	40.6	8.5
1998	46.31565854	2.502126965	116867371	3.68	9665.83	39.1	7.6
1999	46.44268293	2.505011661	119831888	3.44	9906	37.6	8.5
2000	46.624	2.509180608	122876727	3.93	10607.86	36.1	11.5
2001	46.88117073	2.513989191	126004992	3.34	10638.36	34.7	9.6
2002	47.21973171	2.523076776	129224641	3.35	10681.57	34.7	8.8
2003	47.63773171	2.540874123	132550146	3.89	10850.92	32.9	10.8
2004	48.12565854	2.568833681	135999250	5.75	11213.43	30.1	10.18
2005	48.6644878	2.603074687	139585891	5.05	11552.32	29.2	9.37
2006	49.22863415	2.636425201	143314909	5.75	11904.79	28.1	9.94
2007	49.79160976	2.666191559	147187353	5.81	12350.21	26.9	9.8
2008	50.32939024	2.695061599	151208080	3.96	12440.69	25.4	12.8
2009	50.8304878	2.722339258	155381020	-0.04	10867.54	23.7	19.7
2010	51.28941463	51.28941463	159707780	4.18	10297.05	22.5	20.1
2011	51.7102439	2.769633801	161192925	4.12	10563.58	20.9	20

Source: IMF, World Bank CD; CBN (2011)