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## Population Dynamics and Human Capital Development in Nigeria

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### ABSTRACT

Nigeria is a middle-income mixed economy and emerging market, with expanding manufacturing, financial service, communications, entertainment and technology sectors. Although growing at a lower rate than her population, it is ranked as the 27<sup>th</sup>- largest economy in the world in terms of nominal GDP and the 22<sup>nd</sup> largest in terms of purchasing power parity. However, there is no consensus in the literature on the effect of this growing population on human capital development. The study used annual time series data from 1980 to 2016 and adopted serial correlation technique. Using technology as a proxy for human capital development, the results indicate that there is a positive serial correlation between the duo and that population increases at an increasing rate while human capital formation increases at a reducing rate. However, there is no evidence of granger causality between the duo.

The study concludes that policies should be tailored towards existing population productivity order than depopulation policy.

**Keywords:** Population structure, Economic growth, human capital and Dynamics

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### 1. INTRODUCTION

The Malthusian and neo-Malthusian traditions see population growth as a burden to development while for the neo-classical growth model, population is beneficial to an economy due to the belief that population growth is correlated to technological advancement and positive economic outcomes. These two theoretical approaches-neo- Malthusian and neo-Classical Growth Model- were researched in the situation of Nigeria. Population growth may translate to more human resources and greater capacity to produce and consume and ultimately provide employment through functional industrial base and economic growth against poverty (Olayinka Akanle, 2016). The overwhelming wave of population growth forecasted to dramatically alter the societal make-up of Nigeria in the coming half-century is a critical feature of the present day context despite the fact that it will take decades to manifest. As with all population dynamics, the opportunity for key stakeholders to change the current path of this heavy trend requires sustained investments to be made with immediate effect. There are only few studies of population dynamics and human capital development in the literature of demographic economics in recent years.

Particularly, concern has recently been expressed about the population and economic growth. It is against this background that this study seeks to express the potential human capital development effect of population dynamics in Nigeria. Against this background, this study intends to expand the frontiers of knowledge and break limits of theoretical insulations that have plagued contemporary discourse on population and development studies. The broad objective study of this is to examine the effect of population dynamics on economic growth in Nigeria. The specific objectives is to determine the effect of age structure on human capital development in Nigeria, to determine the effect of savings as a determinant for population transition on human capital development in Nigeria and to determine the short-run, adjustment mechanism of the relationship between population dynamics and human capital development in Nigeria.

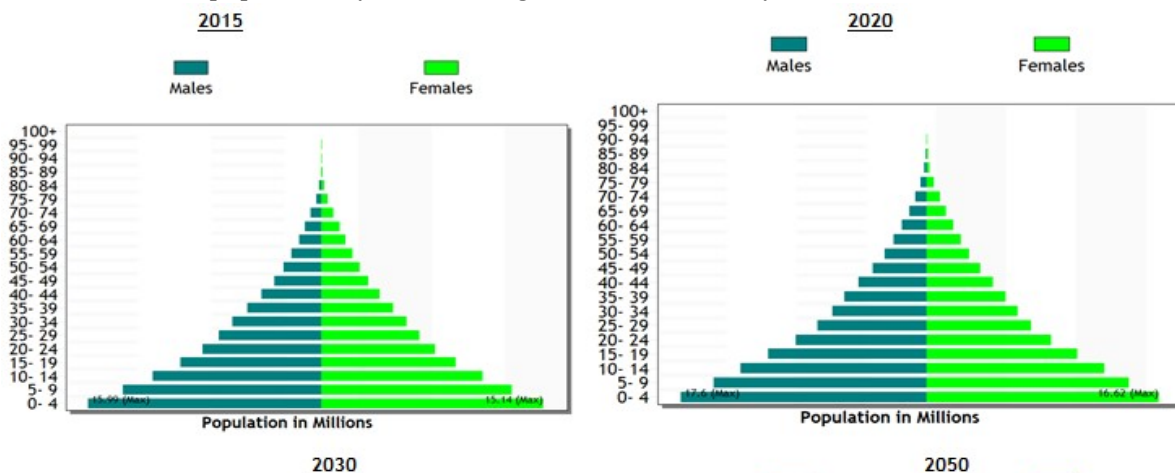
## 2. LITERATURE REVIEW

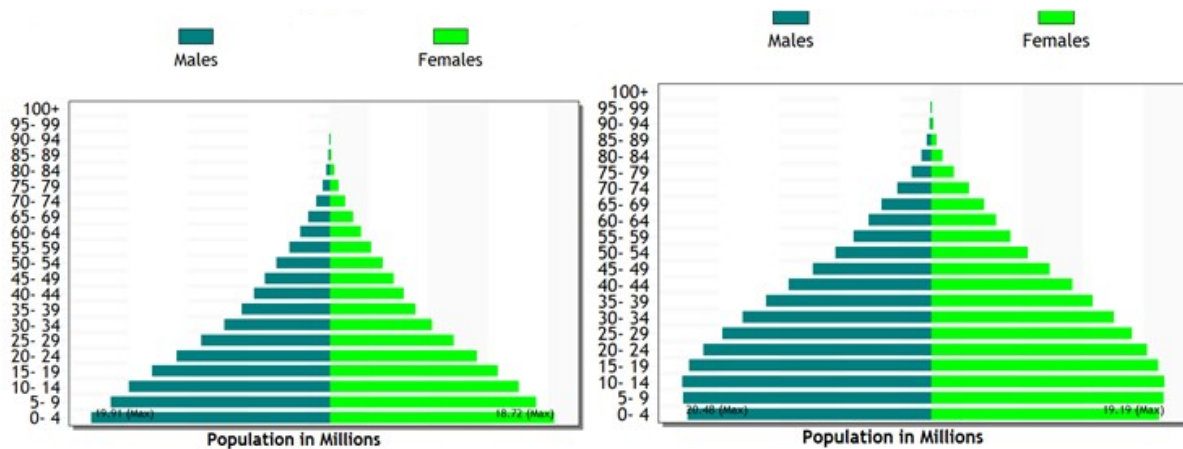
### 2.1 Demographic vulnerability

Demographic vulnerability, according to **ACF, 2016** is the degree and forms of vulnerability for a country or a region faced with its demographic evolution. More specifically, this term has been used to define the challenge multiplier that is population growth for developing countries. In a world of finite space and limited resources projected, population growth can imperil human and economic development, putting millions of people at greater risk for hunger, poverty and water scarcity. Population pressures are also contributing to environmental degradation and political instability. Demographic vulnerability, as it is defined, is confined to countries with rapidly growing populations.

#### 2.1.2 Population distribution in Nigeria

As Nigeria's total fertility rate is currently still over 5 children per woman, even with the assumption of a steady decline, it is still not expected to reach replacement level fertility by the end of 2030 (**United nations, 2016**) Persistently high fertility rates leads to high population growth. The population growth rate is reinforced by the demographic distribution of the population. In 2013, 70% of the population was under age 30 and about 46% of the over 176 million people were aged less than 15 years. This already represents that a very high proportion of the population is of childbearing age and this cohort will grow in the coming decade. Despite a forecasted reduction in the rate of increase the proportion of children/youth aged between 0 and 14 by the middle of the century the population of children and youth will still be quite a large cohort of Nigeria's total population, with 35.2% of the people under 15 by 2050. The Graphs that follows shows the population dynamics in Nigeria and forecast till year 2050.





**Source:** The International Futures (IFs) modeling system, version 7.14. Padree Center Denver University

### 2.1.3 Economic Development

Economic development is sometimes referred to as inclusive or broad-based growth. Growth is inclusive when it creates economic opportunities along with ensuring equal access to them. Economic Development, as the literal meaning of the two words connote, refers to both the pace and pattern of the economic growth (Nafziger, 2012).

There is no universal definition of economic development, but the term development is often used interchangeably with a suite of other terms, including “broad-based growth”, “shared growth”, and “pro-poor growth”. Economic development basically means making sure everyone is included in growth, regardless of their economic class, gender, sex, disability and religion (Lei et al., 2015). Growth is said to be of development dimension when the growth is to be sustainable in the long-run and it should be broad-based across the sectors and inclusive of the larger part of a country’s labour force. Emphasis on development, especially in terms of opportunity in terms of access to markets, resources, and unbiased regulatory environment, is an essential ingredient of successful growth (Alford, Simkins, Rembert & Hoyte, 2014).

Growth is inclusive and becomes economic development if it supports high levels of employment and rising wages (Mitchell, 2018). (Deaton, 2003), argued that economic development is both an outcome and a process. On one hand, it ensures that everyone can participate in the growth process, both in terms of decision making for organising the growth progression as well as in participating in the growth itself. On the other hand, it makes sure that everyone shares equitably the benefits of growth. (Ali, 2007) opined that the key elements in inclusive growth are employment and productivity, development in human capabilities and social safety nets and the targeted intervention (Fotourehchi, 2017) posited that economic development entails achieving sustainable growth that will create and expand economic opportunities and ensure broader access to these opportunities so that members of society can participate in and benefit from growth. Examples of government initiatives that can contribute to active inclusion are improving infrastructure, financial inclusion, health, education, technology and public service delivery.

#### **2.1.4 Human capital development: Full Employment is the key**

The World Bank estimates that 13.6 % of youth were unemployed in Nigeria in 2014 and to match the pace of population growth, Nigeria needs to create between 40 - 50 million additional jobs by 2030. To reduce poverty and promote more inclusive growth, these jobs need to be more productive and provide higher incomes than are available in 2016. The majority of adult Nigerians are underemployed; locked into low-productivity and low-income work, with no job or income security. Income levels are insufficient to escape poverty, or attain middle class status for their households. The public sector is still the largest employer of formal labor and with cuts to government expenditure due to falling oil prices, the new number of jobs in the public sector will decline. The private sector will have to lead the way for employment creation in Nigeria.

### **2.2 Theoretical Review**

#### **2.2.1 Malthusian Theory of population**

The Malthusian model is considered accurate in pre-industrial societies but fails to work correctly in industrialized environments. 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.

#### **2.2.2 Solow Model**

Solow-Swan model is an economic model of long-run economic growth set within the framework of neo-classical economics. It attempts to explain long-run economic growth by looking at capital accumulation, labor or population growth, and increases in productivity, commonly referred to as technological progress. This model is an exogenous model of economic growth that analyzes changes in the level of output in an economy over time as a result of changes in the population pattern/demography. These enable businesses to identify product preferences. It has 3 basic sources namely: Labour (L), Capital (K) and Knowledge (K). Knowledge is used to augment Labour (AL), called effective labour. Generally, Solow model is used to predict economic development and is the only means to increase long-run living standard through technology.

#### **2.2.3 Empirical Review**

Onwuka (2008) empirically tested the association between population growth and economic development in Nigeria between 1980 and 2003 and found that growth in population outweighs that of output and this has hindered the capacity of successive governments to efficiently provide social services to the people, thereby negatively affecting development. He recommended that curbs on population growth through appropriate policies that would integrate the country's population programmers into the main stream development efforts are necessary.

Bloom, Finlay, Humair, Mason, Olaniyan and Soyibo (2010b) used a cross-country growth model to study prospects for economic growth in Nigeria from a demographic perspective. They estimated the size of the demographic dividend Nigeria could enjoy; how it might be increased by health and institutional improvements; and how it might affect poverty. Nwakeze and Omoju (2011) examined the effect of population growth on savings in Nigeria. Net national savings,  $s$ , must equal net investment,  $I$  (Todaro and Smith, 2009), therefore  $S = I$ . In order to grow, economics must save and invest a certain proportion of their GNP. The more they can save and invest, the faster they can grow (Todaro and smith, 2009).

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 five 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). In Nigeria, several studies have examined the relationship between population growth and economic development. The results generally indicate that population growth has positive, negative, or neutral effect on economic development. In order words, there is no empirical consensus yet on the effect of population growth on economic development in Nigeria.

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 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.

#### **2.2.4 The gap in the Literature**

The research outlined in this paper has proceeded in this manner—non-physical capital is human capital. It is human capital that has the capability of producing physical capital or material asset. Therefore, population causal effect of economic growth has its inception from human capital development. Academics from different disciplines and different locations have simultaneously worked on similar themes, but used different datasets and different approaches to structure their work. Many have failed to inculcate or integrate the concept of human capital development.

Although few researchers like Ayinde and Egbetunde (2016) seeks to investigate if unemployment has been persistence and further examines the effect of population growth on the persistence level of unemployment in Nigeria by tracing the impacts that both portends for development outcomes in Nigeria for the period 1970-2012. using Auto-Regressive Distributed Lag (ARDL) Bound test for long-run impacts and equilibrium conditions. Their study shows that population growth does not play a role in the persistence of unemployment (hysteresis) in Nigeria. Results also show that age structure does not matter for development outcomes and that Nigeria is not yet undergoing demographic transition. Interestingly, the results further show that unemployment is a causal factor for population growth.

From the empirical standpoints, Imiosi, Olatunji and Ubi-Abai (2013); Inyang, Priskawetz, Kogel, Saunderson and Scherbov (2004) and Simon (2012) investigated the impact of population on the level of unemployment in least developed countries with focus on the Nigerian economy. Their study was completely devoid of any theoretical framework and technique of analysis suffered on the platter of descriptive analyses.

### 3. METHODOLOGY

The classical school model economic growth or output and argued that output is a function of labour and capital i.e.

$$Y = f(L, K) \quad (3.1)$$

The Solow (1956) allows for substitution between capital and labour. Solow's version of the neoclassical growth model includes residual technological progress as additional determinants of growth as:

$$Y = K(t)^\alpha (A(t)L(t))^{1-\alpha} \ell^{\nu t} \quad (3.2)$$

Where  $Y$  is gross domestic product,  $K$  is the stock of capital (which may include human capital as well as physical capital),  $L$  is labour,  $A(t)$  represents the productivity of labour, which grows over time at an exogenous rate;  $t$  is time;  $\alpha$  is capital elasticity of output;  $1 - \alpha$  is labour elasticity of output, and  $\nu$  is technological residual.

The Solow's neoclassical growth model further indicated that the growth of capital stock ( $g_K$ ) converges towards the growth of output ( $g_Y$ ) in the long-run as:

$$\frac{\dot{Y}}{Y}(t) = \frac{\dot{K}}{K}(t) = g_Y = g_K \quad (3.3)$$

Also, the technological progress grows over time at an exogenous rate,  $\lambda$  i.e.

$$\frac{\dot{A}}{A}(t) = \lambda \quad (3.4)$$

The labour force grows at the rate of population per year as:

$$\frac{\dot{L}}{L}(t) = n \quad (3.5)$$

However, for this purpose of this study, the equation (2) is augmented to incorporate other controlling variable  $X$ . Then, incorporating  $X$  into (2) as:

$$Y = K(t)^\alpha (A(t)L(t))^{1-\alpha} \ell^{\nu t} X^\delta \quad (3.6)$$

The, taking the log of (3.6) and incorporates the growth rates of the factor inputs gives:

$$g_Y = \lambda + \alpha g_K + (1 - \alpha)g_L + \delta g_X + \nu \quad (3.7)$$

$$g_Y(1 - \alpha) = \lambda + (1 - \alpha)g_L + \delta g_X + \nu \quad (3.8)$$



While further simplification gives:

$$g_Y = \frac{\lambda}{(1-\alpha)} + g_L + \frac{\delta}{(1-\alpha)} g_X + \frac{1}{(1-\alpha)} \nu \quad (3.9)$$

$$g_Y = \phi + n + \gamma g_X + \rho \nu \quad (3.10)$$

Where  $\phi = \frac{\lambda}{(1-\alpha)}$  ;  $\gamma = \frac{\delta}{(1-\alpha)}$  ; and  $\rho = \frac{1}{(1-\alpha)}$

The expression (3.10) indicates that growth rate of gross domestic product is dependent on population growth rate, technological progress, and growth of considered control variables.

### 3.1 Model Specification

The Solow's neoclassical growth model as expressed in equ. (3.2) is adapted for this study with further growth parameters adjustment. The labour efficiency is taken to grow at constant growth rate, while the technological progress is residual and exogenously determined within the neoclassical framework. Then,

$$g_{Y(t)} = \phi_0 + \pi_t + \gamma g_{X(t)} + u_t \quad (3.11)$$

The gross domestic product (GDP) growth rate is denoted by  $g_{Y(t)}$ ;  $n_t$  is population growth rate;  $u_t$  is the error and technological residual ( $\rho\nu$ ); and growth of the control variables.

### 3.2 Serial Correlation Test

Table below shows the result of serial correlation test between population growth and technological advancement in Nigeria between 1980 and 2017.

Pairwise Granger Causality Tests

Date: 04/13/19 Time: 09:42

Sample: 1980 2016

Lags: 2

Null Hypothesis:	Obs	Co-efficient	Prob.
POP	36	0.56666	0.6929
Tech		0.07205	0.0005

Result indicates some level of positive serial correlation, although population growth is seen to increase at an increasing rate while technology increases at a decreasing rate.

### 3.3 Granger-Causality Test

The test result in table below is for the granger-causality between technological advancement and considered explanatory variables [population growth rate growth rate (POP) in Nigeria between 1980 and 2017. The results presented on table below indicated that null hypotheses "POP does not Granger Cause Technological advancement" are rejected at 5% significance level.

### 3.4 Granger Causality Test Results

Pairwise Granger Causality Tests

Date: 04/13/19 Time: 09:47

Sample: 1980 2016

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
POP does not Granger Cause Tech	36	10.3370	0.0005
Tech does not Granger Cause POP		0.37205	0.6929

## 4. CONCLUSION

This study critically assessed the economic relationship between population dynamics and human capital development in Nigeria between 1980 and 2016 by taking a look at its relationship level. The results indicate that population increases at an increasing rate while human capital formation increases at a reducing rate. The study concludes that policies should be tailored towards existing population productivity order than depopulation policy since population boom is able to increase human capital development given an appropriate policy formulation and development planning.

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