Journal of Economics

Population Dynamics and Characteristics on the Economic Growth in Kenya

Julius Marichi Maganga and Dr. Jane Omwenga

Stratford Peer Reviewed Journals and Book Publishing
Journal of Economics
Volume 2||Issue 1||Page 1- 17||April||2018|
Email: stratfordjournals.org

Population Dynamics and Characteristics on the Economic Growth in Kenya

[1*] **Julius Marichi Maganga and [2]Dr. Jane Omwenga, PhD**

[1]Post graduate student, Jomo Kenyatta University of Agriculture and Technology, Kenya

[2]Jomo Kenyatta University of Agriculture and Technology, Kenya

***Corresponding email: jmarichi4@gmail.com**

***How to cite this article*: Maganga, J. M. & Omwenga, J., (2018). Impact of Population Dynamics and Characteristics on the Economic Growth of Kenya' *Journal of Economics* Vol 2(1) pp. 1-17.**

Abstract

The main purpose of the study was to establish the impact of population dynamics and characteristics on the economic growth of Kenya. An explanatory research design was adopted. An explanatory research design is used to show how variables relate to each other. The study employed Regression estimation technique and using annual time series data for the period 1963 to 2015. The main sources of these data were: Kenya National Bureau of Statistics publications, Government of Kenya Statistical Abstracts and Economic Surveys. Regression of coefficients results showed that Age structure (as a percentage of working age population) and GDP growth are positively and significantly related (β=8.887757, p=0.0093). The results also revealed that fertility rate (number of births per woman), and GDP growth are negatively and significantly related (β= -3.871491, p=0.0500). In addition, the results revealed that Education level of the population (as a % of total population) and GDP growth are positively and significantly related (β =0.206822, p=0.0008). Lastly, the regression results revealed that life expectancy (in years) and GDP growth are positively and significantly related (β=0.438283, p=0.0267). Based on the findings above, the study concluded that age structure, education level, and life expectancy have an important effect on economic growth while fertility rate have a negative and significant effect on the economic growth rate. The study recommends that the government should put measures to ensure that the economy grows at a higher rate than the population growth. This will ensure that the increasing demand of services arising from the population growth is met. Having a larger, healthier, and better-educated workforce will only bear economic fruit if the extra workers can find jobs. Open economies, flexible labor forces, and modern institutions that can gain the confidence of the population and markets alike may help countries reap the potential benefit created by their demographic transition. Openness to trade can be a key driver of economic growth, helping to significantly boost the benefits a country receives from the demographic transition.

Keywords: *Population age structure, fertility rate, population level of education, economic growth, Kenya*

1.0 Introduction

Population growth is a growing concern throughout the world and a challenge to countries' economies. The world's population was about a billion in 1800 and rose to 2.5 billion in 1950 (Martin 2009). In the year 2007 the world's population was 6.7 billion and is projected to rise to 9.2 billion by 2050 with almost all population growth projected to occur in what are now considered less developed regions. Between 1950 and 2000, when the world's population increased from 2.5 billion to 6.1 billion, the major shifts in population weights by continent were the result of changes in fertility and mortality rather than large-scale migration (Martin, 2009). Economists are torn between three theories; one that state's that population growth helps a nation's economy by stimulating economic growth and development and another that bases its theory on Robert Malthus' findings. Malthus (1798) stated that population increase is detrimental to a nation's economy due to a variety of problems caused by the growth.

Economists advocating the positive side to population growth, say that the population growth creates problems in the short run that include poverty, famine and unemployment. Yet, they also state that in the long run, it leads to new developments through advancement in technology that leave countries better off than if the problems never occurred. On the positive side, there is a chain reaction of events caused by population growth. According to the neo-classical growth model, population is beneficial to an economy due to the fact that population growth is correlated to technological advancement. Rising population promotes the need for some sort of technological change in order to meet the rising demands for certain goods and services. With the increased populace, economies are blessed with a large labor force, making it cheaper as well, due to its immense availability. An increase in labor availability and a low cost for labor results in a huge rise in employment as businesses are more inclined to the cheap labor. Low labor costs results in a shift of money usage from wages into advancement through technology (Coale and Hoover, 1958).

Neoclassical economists argue that free markets will always adjust to the problems created by population growth. It has also been argued that many rural areas in the developing countries are under populated due to scarcity of labor despite the availability of arable land and large increases in agriculture output will occur if labor were available to cultivate it. Many regions in Africa, Latin America and some parts of Asia have this situation. Furthermore, there are many ethnic, racial and religious groups in developing countries that are enamored of large families, and high population growth is considered desirable for political and military power. The last argument does not carry a significant weight because the peculiar situation obtaining in few regions does not warrant high population growth.

Empirical evidence divides the negative consequences of population growth into seven categories. Rapid population growth lowers per capita income growth in most LDCs. The poor bears the brunt of the negative effects of population growth. They become landless, face loss in jobs, and the government reduction of expenditure on education and health. It is generally agreed that large family size and low incomes limit the opportunities of parents to educate all their children. High fertility harms the health of mothers and children. Rapid population growth generates food security problem and contributes to environmental degradation in the form of deforestation, soil erosion, unsafe water, air pollution and urban congestion. Rapid population

growth is the major factor causing increasing international migration both legal and illegal (Population Reference Bureau, 2005).

According to Friedberg and Hunt (2005) population growth and urbanization go together, and economic development is closely correlated with urbanization. Rich countries are urban countries. Population growth increases density and, together with rural-urban migration, creates higher urban agglomeration. And this is critical for achieving sustained growth because large urban centers allow for innovation and increase economies of scale. Companies can produce goods in larger numbers and more cheaply, serving a larger number of low income customers. Many countries have companies which have been benefitting from increasing population growth and density in targeting the large numbers of lower and lower-middle income. Their business model is viable because they can serve a multi-million customer base.

The trend in population growth and Gross Domestic Product (GDP) in Kenya from 1963 to the year 2009 is shown in figure 1. The figure shows that the trend in population growth in Kenya has been fluctuating over the years. The figure shows that the country recorded the highest population growth in 1967 at 4.7 percent. In 1979 the growth rate increased to 3.8 percent from a growth rate of 3.3 percent in 1969. The population growth rate decreased between the years 1979 and 1989 recording a growth rate of 3.4 percent. For the period between 1989 and 1999 growth rate was 2.9 percent which again increased to 3.0 percent for the period 1999 to 2009 (Republic of Kenya, 2010).

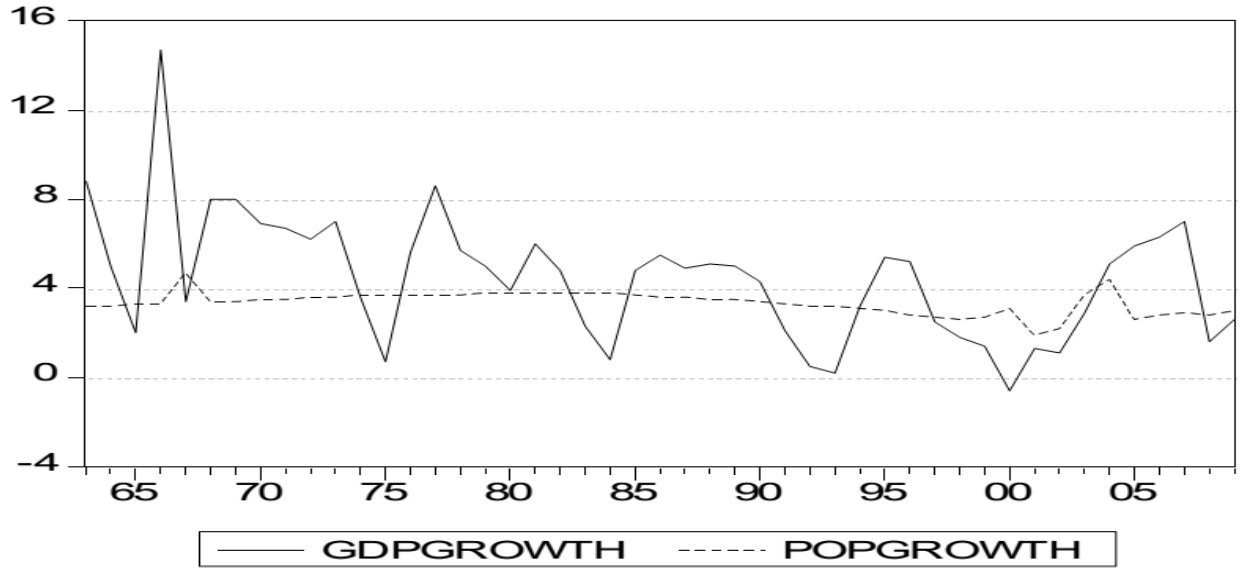

Figure 1 Trends in GDP growth and population growth over the period 1963-2008 Source: Republic of Kenya Economic Survey and Statistical Abstract for various years

1.2 Statement of the Problem

There is continued divergence of opinions regarding the consequences of population dynamics on economic growth. The debate between positive impact and negative impact of population on the economy is thus still ongoing. On the positive side, population growth induces technological advancements and innovations. This is because population growth encourages competition in

business activities and, as the country's population grows, the size of its potential market expands as well. The expansion of the market, in its turn, encourages entrepreneurs to set up new businesses (Simon 1992).

Cross national evidence on the relationship between population and economic growth is inconsistent because the underlying parameters and assumptions vary across countries (Shah, Sargani, Ali, & Siraj, 2015). The existing literature also points out that depending on the country; population dynamics may contribute, deter or even have no impact on economic growth (Nwosu,., Dike and Okwara, 2014). This result is explained by the fact that the effects of population growth change over-time. For example, a higher fertility rate can have a short-term negative effect caused by the cost of expenditures on children whereas it has a long-run positive effect through the larger labour force it generates (Bucci, 2008). It is because of these divergent views among scholars that this study on the impact of population dynamism on economic growth is conducted.

1.3 Research Objectives

i. To establish the impact of population age structure on the economic growth in Kenya.
ii. To determine the impact of fertility rate on the economic growth in Kenya.
iii. To establish the impact of population level of education on the economic growth in Kenya.
iv. To examine the impact of population life expectancy on the economic growth in Kenya.

2.0 Literature Review

2.2 Theoretical Review

2.2.1 Marxist theory of Population

The debate about the Malthusian theory has continued down to the present. Economists such as J.S. Mill and J.M. Keynes supported his theory whereas others, especially, sociologists, have argued against it. According to them, the widespread poverty and misery of the working class people was, not due to an eternal law of nature as propounded by Malthus but to the misconceived organization of society. Karl Marx went one step further and argued that starvation was caused by the unequal distribution of the wealth and its accumulation by capitalists. It has nothing to do with the population. Population is dependent on economic and social organization. The problems of overpopulation and limits to resources, as enunciated by Malthus, are inherent and inevitable features associated with the capitalist system of production.

Marx's contention that food production could not increase rapidly was also debated when new technology began to give farmers much greater 5delds. French sociologist Dupreel (1977) argued that an increasing population would spur rapid innovation and development to solve problems, whereas a stable population would be complacent and less likely to progress. During the depression of the 1930s, the debate changed somewhat because the birth rate fell sharply in industrial (western) nations. Some predicted that human species would die out. Schemes were proposed to encourage families to have more children by giving them allowances for each child

born. The birth rate rose sharply after World War II, especially in the underdeveloped nations like India, Africa and Bangladesh. Birth control programmes were instituted to control the population so as to eliminate starvation (Dupreel, 1977).

Despite the criticisms, the Malthusian thesis gained widespread currency during his lifetime. His ideas had profound effects on public policies, on the classical and neo-classical economists, on demographers and evolutionary biologists led by Charles Darwin. His principle of population has been successful in highlighting the urgency to maintain a balanced relationship between population growth and means of subsistence. The critics of Malthus failed to realize that it was because of a large measure of truth in Malthusian principle of population that men today feel the need of resorting to contraception to keep their families within reasonable limits. Another main contribution of Malthus was to give a new line of thinking whereby the dynamics of population growth were viewed in the context of man's welfare.

2.2.2 Neoclassical Growth Theory

Neo-classical growth theory starts an era that economists try to generate long-run equilibrium models to formulate economic growth and its determinants. Solow and Swan are two pioneers who put forward their growth models respectively under the framework of neo-classical economic theory. The Solow growth model assumes diminishing returns to labour and capital separately and constant returns to both factors jointly (Gokal and Hanif, 2004) One of the features of this model is that saving rate, the growth rate of population and technological progress are defined to be exogenous. The capital level will move to and stabilize at the steady state on which output will keep constant at given exogenous variables. Once this balance is broken by change of exogenous variables, new steady state will be achieved. Furthermore, Abramovitz and Solow adopt growth accounting to give a direct expression of composition of economic growth based on the Solow model shown in equation (2) at below.

$Y^*(t)/Y(t)-L^*(t)/L(t)=\alpha_K(t)[K^*(t)/K(t)-L^*(t)/L(t)]+R(t)$……..(1)

$Y^*(t)/Y(t)$……. growth rate of output

$K^*(t)/K(t)$…….. growth rate of capital

$L^*(t)/L(t)$…… growth rate of labour

$\alpha_K(t)$…… the elasticity of output with respect to capital at time t

R (t)……... the Solow Residual (Romer, 2006).

Equation (2) shows the channels through which variables will affect economic growth. It is obvious that growth under the Solow model will relate to the growth of capital, labour and the Solow Residuals. The Solow Residuals is TFP (Total Factor Productivity) which is regarded as the index of technological progress.

2.3 Conceptual Framework

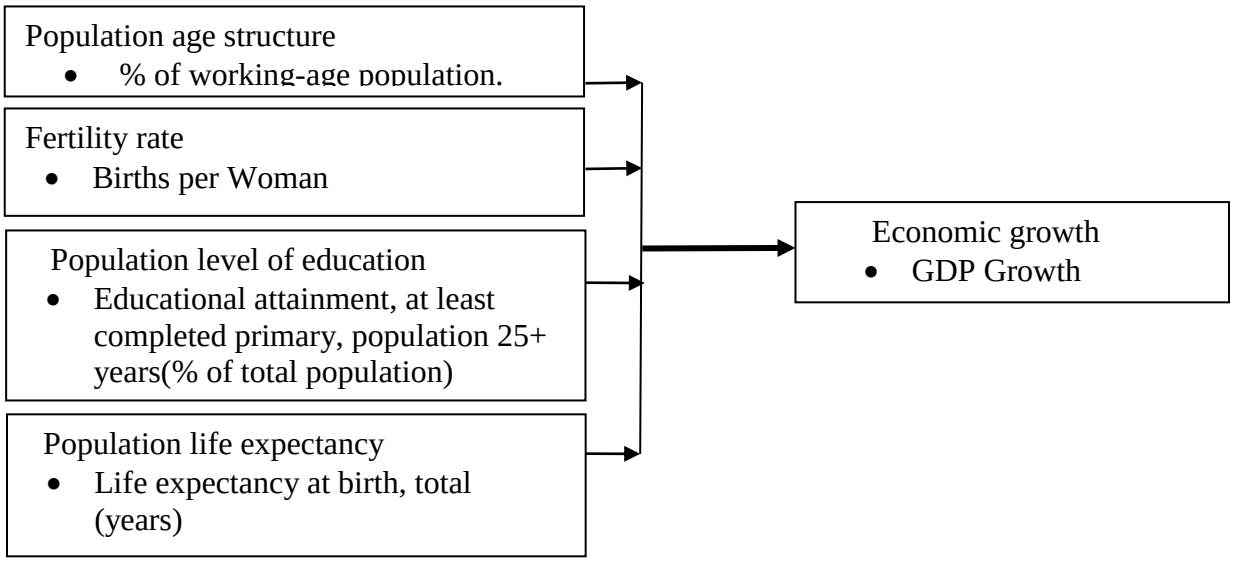

Figure 2: Conceptual Framework

3.0 RESEARCH METHODOLOGY

An explanatory research design was adopted. The study was based on the model by Solow growth model. Solow's model takes the rate of saving, population growth and technical progress as exogenous. There are two inputs capital and labor which are paid their marginal products.

Start with a Constant Returns to Scale (CRTS) production function:

$Y = f(K, L)$……3.1

CRTS implies that by multiplying each input by some factor "z", output changes by a multiple of that same factor: $zY = f(zK, zL)$……..3.2

In this case, let $z = 1/L$. That means:

$Y * 1/L = f(K * 1/L, L * 1/L)$ ……3.3

or

$Y/L = f(K/L, 1)$

define $y = Y/L$ and $k = K/L$, so that the production function can now be written as

$y = f(k)$,

where y is output per worker and k is capital per worker.

The demand for goods, in this simple model, consists of consumption plus investment:

$y = c + i$

where $y = Y/L$; $c = C/L$; and $i = I/L$.

Investment, as always, creates additions to the capital stock.

The consumption function in this simple model is: C = (1 – s) Y,

which can be rewritten as c = (1 – s) y, where "s" is the savings rate and $0 < s < 1$.

Going back to the demand for goods, y = c + i, we can rewrite this as

y = (1 – s) y + i

y = y – sy + i

so, y – y – sy = i

which means that sy = i: savings equals investment.

We can now put our knowledge to use by looking at a simple model of growth.

Investment adds to the capital stock (investment is created through savings):

i = sy = s f(k)

The higher the level of output, the greater the amount of investment

The steady state level of capital stock is the stock of capital at which investment and depreciation just offset each other.

The Golden Rule level of capital accumulation is the steady state with the highest level of consumption. The idea behind the Golden Rule is that if the government could move the economy to a new steady state, where would they move? The answer is that they would choose the steady state at which consumption is maximized. To alter the steady state, the government must change the savings rate.

Since y = c + i,

then c = y – i

which can be rewritten as c = f(k) – s f(k)

which, in the steady state, means c = f(k) – δk. This indicates that to maximize consumption, we want to have the greatest difference between y and depreciation.

Since we want to maximize c = f(k) – δk, we take the first derivative and set it equal to zero:

$$dc = \frac{\partial f}{\partial k} dk - \delta\, \partial k = 0$$

Since we are looking at incremental changes in k, dk = 1, which leaves us with

the result that at the Golden Rule, the marginal product of capital must equal the rate of depreciation: $MP_K = \delta$.

Introducing Population Growth

Let "n" represent growth in the labor force. As this growth occurs, k = K/L declines (due to the increase in L) and y = Y/L also decines (also due to the increase in L).

Thus, as L grows, the change in k is now:

$\Delta k = s*f(k) - \delta*k - n*k$, ……3.4

where n*k represents the decrease in the capital stock per unit of labor from having more labor. The steady state condition is now that $s*f(k) = (\delta+n) * k$……3.5

In the steady state, there's no change in k so there's no change in y. That means that output per worker and capital per worker are both constant. Since, however, the labor force is growing at the rate n (i.e., L increases at the rate "n"), Y (not y) is also increasing at the rate "n". Similarly, K (not k) is increasing at the rate n.

3.4 Empirical Model

Relating theoretical model to the study, the equation to be estimated in this study will be

$GDP_t = f(POP_t)$…….....3.6

Expanding equation 3.6 gives the following model:

GDP_t = f (population age structure, fertility rate, population level of education, population life expectancy)…….....3.7

GDP_t = α+population age structure + $\beta_1$fertility rate + $\beta_3$population level of education + $\beta_4$population life expectancy+ μ_t ……
.3.8

μ = Error term

In the model, β_0 = the constant term while the coefficient β_ii= 1….3 will be used to measure the sensitivity of the dependent variable (GDP) to unit change in the predictor variables.

3.5 Data Analysis and Presentation

Descriptive statistics such as, mean and frequencies was used to perform data analysis. The mean scores was used to rate the factors in order of their importance. EVIEWS was used in the analysis.A multivariate regression model was used to link the independent variables to the dependent variable as follows;

$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \mu$

Where;

Y = GDP Growth

X_1 = Population Age Structure

X_2 = Fertility Rate

X_3 = Population Level of Education

X_4 = Population Life Expectancy

In the model, β_0 = the constant term while the coefficient β_ii= 1….4 was used to measure the sensitivity of the dependent variable (Y) to unit change in the predictor variables X_1, X_2, X_3 and X_4,. μ is the error term which captured the unexplained variations in the model (Olusola et. al, 2013).

Stratford Peer Reviewed Journals and Book Publishing
Journal of Economics
Volume 2||Issue 1||Page 1- 17||April||2018|
Email: stratfordjournals.org

4.0 Research Results and Discussion

4.2 Descriptive Statistics

This section provides results on measures of central tendency of independent variables in Table 1. The results show that the overall mean of GDP growth was 4.729% which indicate the average of GDP growth in Kenya from the year 1960 to 2015. The minimum and the maximum of GDP growth between the year 1960 and 2015 were -7.774635% and 22.17389% respectively. Its standard deviation was 4.575807% which indicated that GDP growth rate varied throughout the measurement period.

The overall mean of population age structure (as a percentage of working age population) was 6.044566%. The minimum and the maximum of population age structure as a percentage of working age population between the year 1960 and 2015 were 4.860474% and 7.529304% respectively. Its standard deviation was 0.956706% which indicated that population age structure as a percentage of working age population varied throughout the measurement period.

The overall mean of fertility rate (number of births per woman) was 6 children. The minimum and the maximum of fertility rate (number of births per woman) between the year 1960 and 2015 were 4 children and 8 children respectively. Its standard deviation was 1.431493 which indicated that fertility rate (number of births per woman) varied throughout the measurement period.

The overall mean of Population Education Level (as a % of total population) was 40.03962%. The minimum and the maximum of Education Level (as a % of total population) between the year 1960 and 2015 were 21.00000% and 60.00000% respectively. Its standard deviation was 11.38923% which indicated that Education Level (as a % of total population) varied throughout the measurement period.

The overall mean of Life Expectancy (in years) was 55.08533 years. Its minimum and the maximum between the year 1960 and 2015 were 46.36241 years and 62.13373 years respectively. Its standard deviation was 4.159160 years which indicated that Life Expectancy (in years) varied throughout the measurement period.

Table 1: Descriptive Statistics

	GDP Growth	Age Structure (% of working age population.	Fertility Rate(No of Births per woman	Education Level(as a % of total population)	Life Expectancy
Mean	4.729599	6.044566	6.358912	40.03962	55.08533
Median	4.480580	5.767182	6.422000	39.00000	55.53395
Maximum	22.17389	7.529304	8.126000	60.00000	62.13373
Minimum	-7.774635	4.860474	4.263000	21.00000	46.36241
Std. Dev.	4.575807	0.956706	1.431493	11.38923	4.159160
Skewness	0.967072	0.337762	-0.034154	-0.019597	-0.209164
Kurtosis	6.899982	1.544131	1.327764	1.921666	2.030434
Jarque-Bera	44.21847	6.117730	6.652470	2.765307	2.648261
Probability	0.000000	0.046941	0.035928	0.250912	0.266034
Sum	264.8575	344.5403	362.4580	2282.259	3139.864
Sum Sq. Dev.	1151.591	51.25602	114.7537	7264.019	968.7222
Observations	57	57	57	57	57

4.3 Trend Analysis

Trend analysis was conducted for GDP growth, population age structure (as a percentage of working age population), fertility rate (number of births per woman), Population Education Level (as a % of total population) and Life Expectancy (in years). The trend lines are presented in the subsequent sections.

4.3.1 GDP Growth

The study sought to establish the trend in the movement of average annual real GDP in Kenya over the study period. The findings were as shown in the Figure 3. Figure 3 indicates that real GDP increased with a fluctuating trend from the year 1960 to 1975.

Figure 3: Real GDP analysis from 1960 to 2015

Then it leveled off in the year between 1980 to 2002. It gradually increased from 2002 to 2007. The results further indicated that in the subsequent year i.e. from 2008 to 2009, the real GDP significantly dropped. This drastic decline in the real GDP was mainly due to the low performance within the economy due to the post-election violence which occurred in the years 2007/2008 and thus this trickled down to the performance of individual sectors and thus negatively impacting on the real GDP of the country. Following the recovery of the economy the real GDP then rose in 2009 to 2011 and a slight decline in 2012 and this decline was mainly attributable to the state of affairs in the country which was awaiting its elections and thus at this time the investor confidences were negatively impacted for fear of the repeat of a state of political instability in the country, then stabilizing in the year 2014 and 2015.

4.3.1 Population age structure

The study sought to establish the trend in the movement of population age structure (as a percentage of working age population) in Kenya over the study period. The working age population is defined as those aged 15 to 64. The findings were as shown in the Figure 4. Figure 4 indicates that there has been a decline in population age structure (as a percentage of working age population) from the year 1960 to 2015. This also means that there is a high dependency ratio.

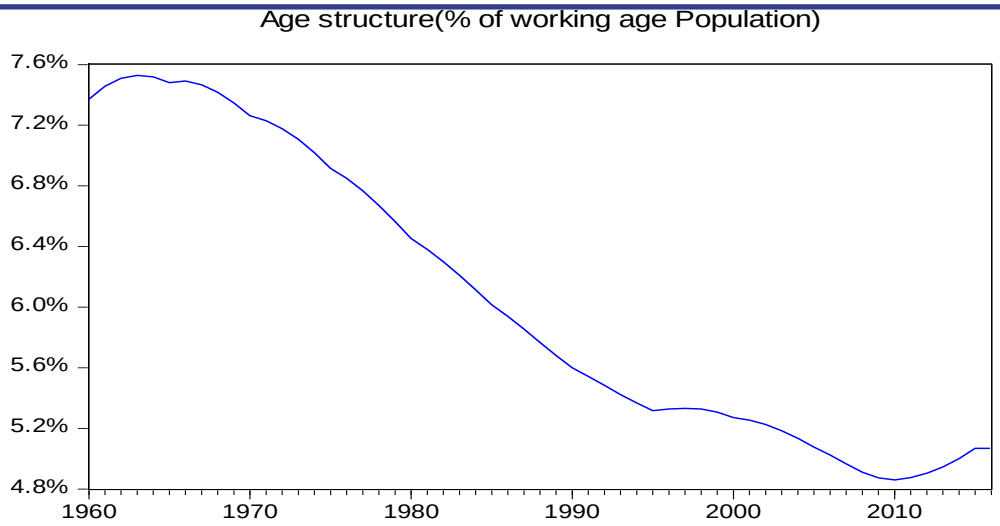

Figure 4: Population Age Structure (as a Percentage of Working Age Population)

4.3.2 Fertility Rate

The study sought to establish the trend in the Fertility Rate (number of births per woman) in Kenya over the study period. The findings were as shown in the Figure 5. The trend line shows that Fertility Rate (number of births per woman) has been on a decline from the year 1960 to 2015. The broad bases in both "Kenya 1970" and "Kenya 1990" represent a large number of children in relation to the working age population. "Kenya 2010" shows a base that is beginning to narrow at the youngest ages, representing a fertility decline. "Kenya 2030" is the United Nations projection of Kenya's population age structure if fertility continues to decline.

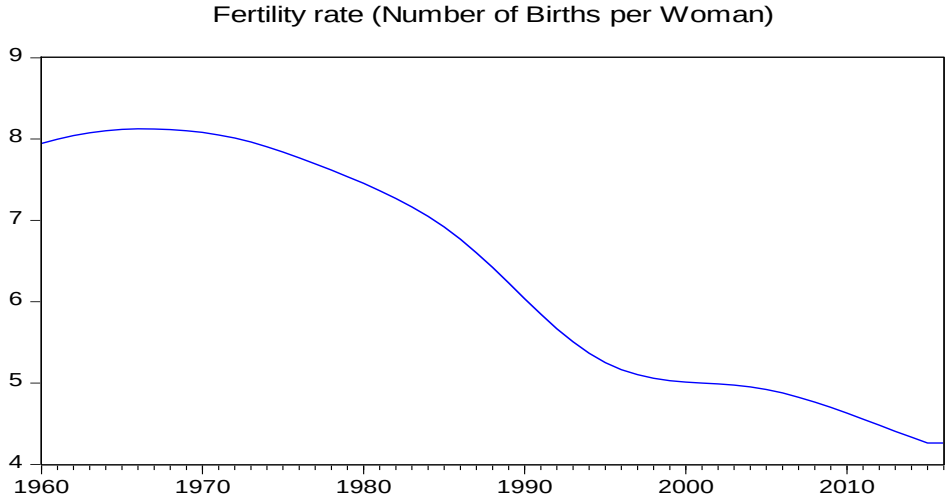

Figure 5: Fertility Rate (number of births per woman)

4.3.3 Population level of education

The study sought to establish the trend in the Population Education Level (as a % of total population) in Kenya over the study period. The findings were as shown in the Figure 6.

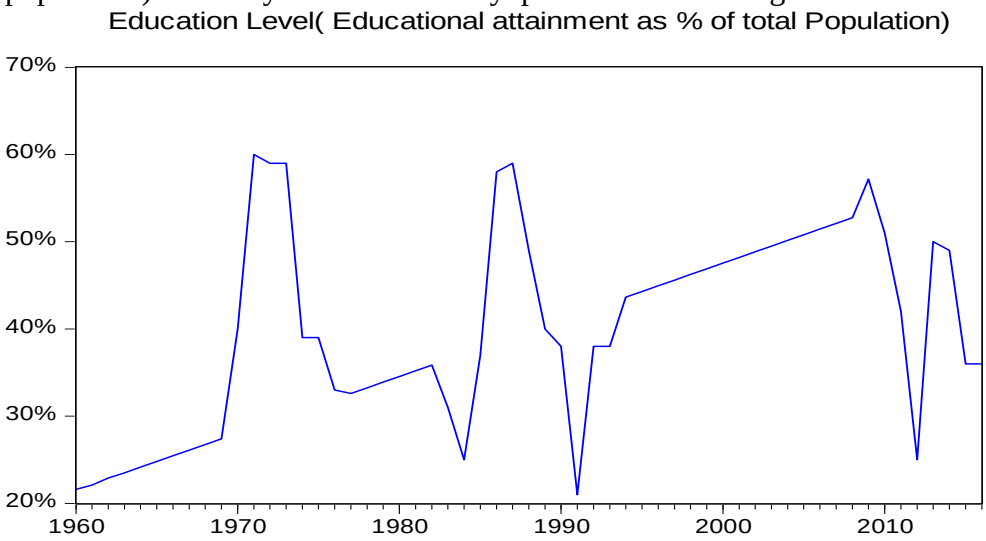

Figure 6: Population Education Level (as a % of total population)

The trend line shows that there has been a general fluctuation in the Population Education Level (as a % of total population) though with an increasing trend. Education is recognized as a key determinant in human development through more opportunities and enhanced earnings. Unequal opportunities in access to education have long-term consequences that include intergenerational persistence of poverty. The level of education of the household head is a key determinant of future earnings, child health, and other social and economic outcomes (Bourguignon et al. 2007, Kovacevic, 2010). Higher educational attainment and more equal access across all segments of the population should enhance participation in the labour market, increase economic growth and contributed to more equitable distribution of incomes in the long term.

4.3.4 Population life expectancy

The study sought to establish the trend in the Life Expectancy (in years) in Kenya over the study period. The findings were as shown in the Figure 7. The trend line shows that there were a general increase in the life expectancy from the year 1960 to 1990 before it sharply dropped down in the year 2000. It then rose up continuously up to the year 2015. Kenyans can now expect to live an average of 63.4 years, compared to 51 years at the start of the 21st century. Women in Kenya are likely to live nearly five years longer than men (WHO 2015).

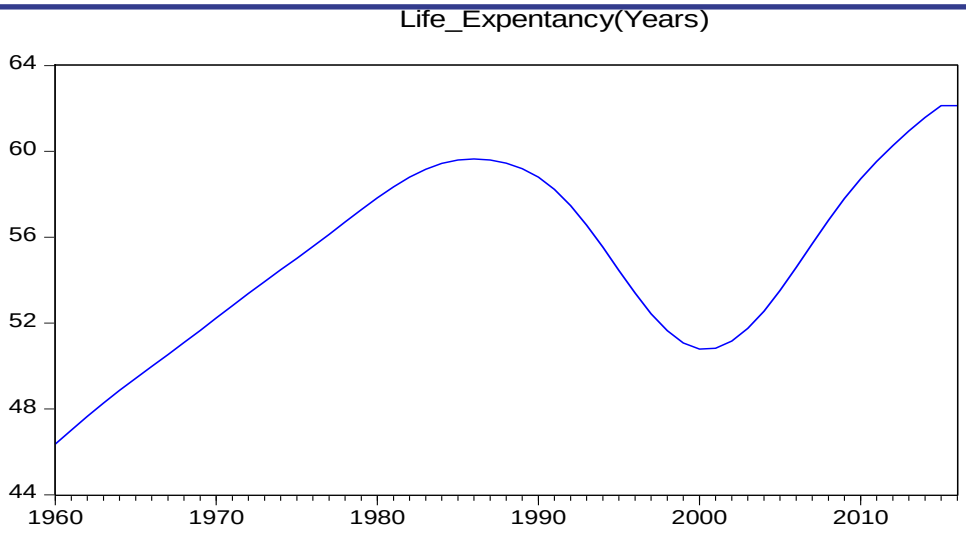

Figure 7: Life Expectancy (in years)

4.4 Correlation Analysis

Table 2 presents the results of the correlation analysis. The results revealed that Age structure and GDP growth are positively and significantly associated (r=0.216486, p=0.01090). The results also revealed that fertility rate and GDP growth are negatively and significantly associated (r=-0.199884, p=0.01397).

Table 2: Correlation Matrix

Correlation / Probability	GDP GROWTH	AGE STRUCTURE	FERTILITY RATE	EDUCATION LEVEL	LIFE EXPENTANCY
GDP GROWTH	1.000000				

AGE STRUCTURE	0.216486	1.000000			
	0.01090	-----			
FERTILITY RATE	-0.199884	0.971399	1.000000		
	0.01397	0.0000	-----		
EDUCATION LEVEL	0.211676	-0.500080	-0.455377	1.000000	
	0.01173	0.0001	0.0004	-----	
LIFE EXPENTANCY	0.009005	-0.513929	-0.389488	0.196122	1.000000
	0.009475	0.0001	0.0030	0.1474	-----

In addition, the results in table 2 revealed that Education level of the population and GDP growth are positively and significantly associated (r=0.211676, p=0.01173). Lastly, the correlation results revealed that life expectancy and GDP growth are positively and significantly associated (r=0.009005, p=0.009475). These findings are consistent with that of Nwosu, Dike, and Okwara

(2014) who conducted a study on the effects of Population Growth on Economic Growth in Nigeria. Empirical results support that population growth has a significant impact on economic growth.

4.6 Regression Analysis

After conducting the diagnostic tests, regression model was run. Results are presented in Table 3. Results revealed that Population age structure (as a percentage of working age population), fertility rate (number of births per woman), Population Education Level (as a % of total population) and Life Expectancy (in years) were found to be satisfactory variables in explaining GDP growth. This is supported by coefficient of determination also known as the R square of 0.5679. This means that population age structure (as a percentage of working age population), fertility rate (number of births per woman), Population Education Level (as a % of total population) and Life Expectancy (in years) explain 56.79% of the variation in GDP growth in Kenya.

Further, F statistic results in Table 3 indicated that the overall model was statistically significant. The results imply that the independent variables (population age structure (as a percentage of working age population), fertility rate (number of births per woman), Population Education Level (as a % of total population) and Life Expectancy (in years)) are good predictors of GDP growth. This was supported by an F statistic of 4.6679 and the reported p value (0.0027) which was less than the conventional probability of 0.05 significance level.

Regression of coefficients results in table 3 shows that Age structure (as a percentage of working age population) and GDP growth are positively and significantly related (β=8.887757, p=0.0093). This means that an increase in the percentage of working age population by 1% leads to an increase in GDP growth by 8.887%. The results also revealed that fertility rate (number of births per woman), and GDP growth are negatively and significantly related (β= -3.871491, p=0.0500). This means that an increase in the number of births per woman by 1% leads to a decrease in GDP growth by 3.871%. In addition, the results revealed that Education level of the population (as a % of total population) and GDP growth are positively and significantly related (β =0.206822, p=0.0008). This means that an increase in the education attainment by 1% leads to an increase in GDP growth by 0.206%. Lastly, the regression results revealed that life expectancy (in years) and GDP growth are positively and significantly related (β=0.438283, p=0.0267). This means that an increase in the life expectancy by 1% leads to an increase in GDP growth by 0.438%. Results are presented in Table 3.

These findings are consistent with that of Furuoka, (2009) who carried out a study on the Population growth and economic development and found out that population growth in Thailand has a positive impact on the country's economic performance. These findings support the population-driven economic growth hypothesis which states that population growth promotes economic development. The finding is also consistent with that of Shah, Sargani, Ali, & Siraj, (2015) who carried a study on the Effect of Increase in Population on the Economic Growth of Bangladesh and found out that economic growth and population are both negatively correlated and that an increase in population will have a negative impact on the economic growth of Bangladesh. Government can focus on family planning programs to overcome the negative consequences of rapidly increasing population.

Table 3: Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Age Structure	8.887757	3.286702	2.704157	**0.0093**
Fertility Rate	-3.871491	1.970937	-1.964290	**0.0500**
Education	0.206822	0.058177	3.555065	**0.0008**
Life Expectancy	0.438283	0.192082	2.281748	**0.0267**
C	-56.83404	18.23112	-3.117418	0.0030

R-squared	**0.567998**	Mean dependent var	4.729599
Adjusted R-squared	0.510586	S.D. dependent var	4.575807
S.E. of regression	4.065559	Akaike info criterion	5.728025
Sum squared resid	842.9672	Schwarz criterion	5.908860
Log likelihood	-155.3847	Hannan-Quinn criter.	5.798134
F-statistic	**4.667973**	Durbin-Watson stat	2.140707
Prob(F-statistic)	**0.002748**		

Therefore, as per the results above, the estimated model was as shown below:

$Y = -56.834 + 8.887X_1 - 3.871X_2 + 0.206X_3 + 0.438X$

Where;

Y =Economic growth (GDP Growth)

X_1 = Population Age Structure (as a percentage of working age population)

X_2 = Fertility Rate (number of births per woman)

X_3 = Population Level of Education (education attainment as a % of total population)

X_4 = Population Life Expectancy (In years)

5. 0 Conclusions

Based on the findings above, the study concluded that age structure have an important effect on economic growth. These effects work through a pure accounting effect (a change in the ratio of producing to consuming people in an economy) and a behavioral effect which relates to the change in output per working age person.

The study concludes education level influence the economic growth. It is the change in educational attainment levels that are the primal source of the demographic dividend effects that are present in the data. Empirically, the pure effect of changes in age structure on economic growth appears to take place exclusively through translation effects related to the measurement of income as GDP per capita instead of GDP per worker.

It should be noted that, given the fact that our preferred specifications control for both educational attainment and labor force dynamics, the estimated effects of human capital go beyond the increase in participation expected from more educated populations. Since we are not able to reject that participation and age structure effects take place exclusively through the

translation mechanism, it is the increased productivity and technology innovation or adoption capabilities of more educated individuals in the labor force that explains growth differences in GDP per worker within countries. The study also concluded that fertility rate influence economic growth in Kenya.

6.0 Recommendations

The study found out that population age structure has a positive and significant effect on GDP growth. Therefore, the study recommends for Kenya economy to need to invest more in schools for young populations (high percentage under age 15), while to invest more in the health sector for older populations (high percentage ages 65 and over). The age structure can also be used to help predict potential political issues. For example, the rapid growth of a young adult population unable to find employment can lead to unrest. Moreover, the population age structure may affect real per capita income growth depending on the size of the degree of altruism of agents towards future generations and on the nature of technical progress, for given agents' degree of altruism.

The government should also put measures to ensure that the economy grows at a higher rate than the population growth. This will ensure that the increasing demand of services arising from the population growth is met. Having a larger, healthier, and better-educated workforce will only bear economic fruit if the extra workers can find jobs. Open economies, flexible labor forces, and modern institutions that can gain the confidence of the population and markets alike may help countries reap the potential benefit created by their demographic transition. Openness to trade can be a key driver of economic growth, helping to significantly boost the benefits a country receives from the demographic transition. There is a need for research and analysis on the relevance of Africa's educational system to rural development, for it appears that the current educational policy produces unemployment and redundant labour in the urban areas where the government and private sectors appear to have limited employment opportunities.

With the results indicating a positive correlation between Population life expectancy and economic growth in Kenya, then a carefully planned population growth strategy coupled with institutional and policy changes could be beneficial to this country. A well-managed population expansion will ensure that both the population and the economy are complementing each other without concerns that population expansion will lead countries to famines and lack of other socio economic facilities since it's the inadequate government policies, rather than population growth which are responsible for the woes including, famines that besiege most developing nations.

7.0 References

Bucci, A. (2008). Population growth in a model of economic growth with human capital accumulation and horizontal R&D. *Journal of Macroeconomics*, *30*(3), 1124-1147.

Coale, A. J., and Hoover E., M. (1958) *Population Growth and Economic Development in Low-Income Countries* .Princeton: Princeton University Press.

Economic Survey (2014) (various issues), Islamabad, Ministry of Finance, Government of Pakistan. Economic Advisor Wing.

Friedberg, R. & J. Hunt (2005). "The Impact of Immigrants on Host Country Wages, Employment and Growth (in Symposia: Immigration)." The Journal of Economic Perspectives (2): 23 -44.

Furuoka, F. (2009). Population growth and economic development: New empirical evidence from Thailand. *Economics Bulletin*, *29*(1), 1-14.

Gokal, V., Hanif, S., (2004), *Relationship Between Inflation and Economic Growth*, Working Paper 2004/04, Economic Department, Reserve Bank of Fiji, Suva, Fiji.

Malthus, T.R. (1798), An Essay on the Principles of Population, (Cambridge: Cambridge University Press.

Nwosu, C., Dike, A. O and Okwara, K. K (2014). The Effects of Population Growth on Economic Growth in Nigeria. *The International Journal Of Engineering And Science (IJES)* ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805

Population Reference Bureau (2005), World Population Data Sheet, New York, 2005.

Republic of Kenya (2010). *2009 Kenya Population and Housing Census*. Government Printer, Nairobi.

Romer, D., (2006), Advanced Macroeconomics, 3rd edition, McGeaw-Hill.

Shah, T., Sargani, G. R., Ali, A., & Siraj, W. (2015). The Effect of Increase in Population on the Economic Growth of Bangladesh.

Simon, J. L. (1992) *Population and Developing Countries*, Princeton University Press: Princeton, New. Jersey