

# **Harnessing Kenya's Demographic Dividend: Effects of Population Dynamics**

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## *KIPPRA in Brief*

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## **Abstract**

*This study investigates the effects of population dynamics as Kenya strives to reap from demographic dividend arising from accelerated economic growth as the population changes. At the moment, 78 per cent of Kenya's population is aged below 35 years mainly due to high fertility, leading to a high dependency ratio that limits savings to invest. As a result, the government is committing more resources to non-productive sectors in the provision of education, health and other facilities for children. The high population growth is not in tandem with job creation, leading to high unemployment levels mostly affecting the youth aged 15-35 years. In the recent past, the country has experienced a rise in cases of insecurity, youth radicalization, terrorism, drug abuse and alcoholism, which are partly blamed on youth unemployment and frustrations.*

*Through the Economic Recovery Strategy and Medium Term Plans, although without much success, the government has made several interventions to create jobs through Kazi Kwa Vijana, Uwezo Fund, Women Enterprise Fund, Youth Enterprise Fund and Access to Government Procurement Opportunities. But unemployment remains a major challenge against the ever increasing population, culminating into a large unemployed working age population. These are the basis that motivated this study which uses data for the period 1970-2012, and employed an economic growth model.*

*The study found that the country stands a chance to benefit from demographic dividend if appropriate policies are put in place. However, the current population dynamics pose a challenge towards this realization. The government needs to adopt holistic age-specific approaches targeting mostly children (0-15 years) and youth (15-34 years) in order to reduce the dependency ratio, develop human capital, and create jobs. The study recommends a holistic age-specific approach dubbed project '034' in order to give the zero to 34 years age group maximum attention so as to not only reap from the demographic dividend but also prevent the young generation from drifting into criminal activities. Of importance is to reduce the fertility rate to check on population growth and dependency ratio, and implement policies that create jobs for the large working age population. These include policies to enhance the average years of schooling, trade openness, incentives and skills. The policies should not be implemented in isolation but holistically.*

## **Abbreviations and Acronyms**

ECT	Error Correction Term
GDP	Gross Domestic Product
KIPPRA	Kenya Institute for Public Policy and Research Analysis
KNBS	Kenya National Bureau of Statistics
MTP	Medium Term Plan
NCPD	National Council for Population and Development
UNFPA	United Nations Population Fund

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# 1. Introduction

## 1.1 Background

Demographic dividend is a window of opportunity for accelerated economic growth as a result of population changes (National Council for Population and Development-NCPD, 2013). It is measured in terms of per capita income and occurs when the high labour supply resulting from change in population distribution becomes economically productive. In life, the working age population is economically active, while the young and elderly are consumers. Population dynamics are determined by fertility and mortality rates, among other factors. For instance, a few decades after the decline in fertility and mortality rates, the proportion of working age population in a country tends to enlarge (Lam and Leibbrandt, 2014). Creation of employment opportunities to absorb such large labour force leads to a decline in dependency ratio, with the number of young and old population being supported by the working population. This enhances the country's per capita savings, which boosts investment and productivity, culminating in accelerated economic growth. However, in order to convert the large working age population to be economically productive, the right policies must be in place. They include economic, labour-market flexibility, good governance, education, family planning and health policies. Demographic dividend can occur at two levels; the first, a rise in share of working age population, while the second is achieved later when the population above working age (retired) becomes economically productive. This study focusses on the former.

Demographic dividend provides the relationships between population change and economic growth. Emerging evidence indicates that population affects economic growth and age structure plays a critical role through labour supply (Bloom and Canning, 2008). As a country's total fertility and mortality rates change, population changes in terms of numbers and age group compositions. Previously, focus has been on the effects of population growth on economic growth, ignoring the critical aspect of age-structure (Bloom *et al.*, 2001). Changes in age structure tend to interact with labour-market, health, education, economic and economic growth policies through the resource needs and productivity. Different age groups have different economic behaviours which affect government policies. For instance, a country with a high proportion of children and the elderly will allocate more resources towards their care, slowing down economic growth since resources are allocated to a non-productive population. However, if there is a high proportion of working age group, they can be economically productive if given the right environment (Bloom and Canning, 2008).

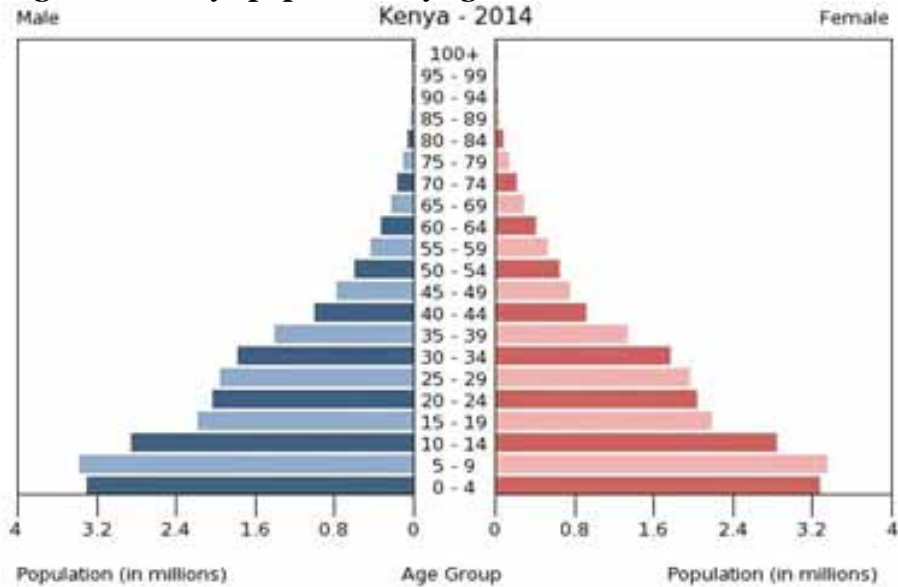
Population change can have three types of effects on economic growth; restricting, promoting or being independent leading to the pessimist, optimist and neutralist theories, respectively (Bloom et al., 2003). Pessimists argue that as population grows, it negatively affects economic growth due to competition for the limited resources. Optimists argue that as population grows, it leads to economic growth through human capital development and technological advancement. The neutralists, on the other hand, argue that population growth has no effect on economic growth. The type of effect realized depends on government policy response in regard to change in the different age groups in a particular period. It is through the optimist theory that countries have put appropriate policies that create employment opportunities, hence reaping from demographic dividend.

In the world, the accelerated economic growth experienced around 1990s in East Asian countries of South Korea, Taiwan, Singapore, the former Hong Kong Territory, Thailand, Indonesia and Malaysia were attributed to demographic dividend (Cincotta *et al.*, 1997). The fertility rate decline experienced in 1960s and 1970s led to a fall in dependency ratio that enhanced domestic savings and boosted investment. The East Asian countries provide the most compelling evidence on demographic dividend with what came to be called 'economic miracle', a situation of rapid economic growth driven by high level of labour supply. Japan and Western Europe countries reaped from demographic dividend although they are now experiencing ageing population challenge. The Latin America has undergone less dramatic transition compared to East Asia, although Brazil, Chile and Uruguay are ahead of the other countries (Gomez and Hernandez, 2008).

In Middle East and North Africa, economic growth of the last two decades was attributed to growth in working age population. In Egypt, specifically, the demographic transition through 1990 is estimated to have accounted for one-sixth of the growth per capita GDP (Bloom and Canning 2009). Sub-Saharan Africa lags behind other regions in terms of fertility change, and the period of declining dependency ratios lies largely in the future. However, there are exceptions in Namibia, Botswana, South-Africa, Zimbabwe and Kenya where the fertility rate is declining (Cleland, 2012). The fertility rate decline in South Africa and Botswana is mainly due to the effects of HIV/AIDS.

Kenya's fertility rate declined to 3.97 in 2012 from 6.7 in 1969, leading to a young and youthful population. The youth (15-34 years) and children (0-14 years) constitute 35.2 and 43 per cent, respectively (Kenya National Bureau of Statistics-KNBS, 2013). This implies that more than three quarters of the population is aged below 35 years. On the other hand, the working age group population (15-64 years) constitutes 53.4 per cent. As shown by Figure 1.1, a large proportion of the population is concentrated at the bottom where 43.1 per cent of the total population is aged below 15 years.



**Figure 1.1: Kenya population by age structure**

Source: NCPD (2013)

## 1.2 Essentials for Achieving Demographic Dividend

Realizing demographic dividend is not automatic; it depends on the underlying environment. A favourable working force is necessary but it depends on the conditions a country has put in place for employment creation (Bloom *et al.*, 2003). There should be a favourable age structure constituting a large working-age population (15-64 years) and a small dependent population (0-14 and above 64 years). There should also be an appropriate policy environment that creates employment and helps accelerate economic growth. The policies include:

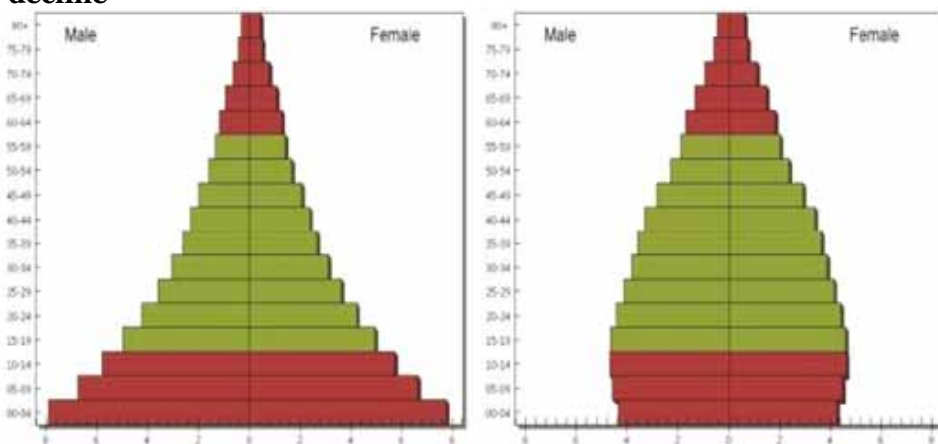
- Health
- Family planning
- Education, especially for girls
- Economic policies
- Good governance
- Labour market policies
- Financial market
- Human capital

Improvement in health implies that citizens get treatment for most of the illnesses which reduces the mortality rate and raises life expectancy, while family planning directly contributes to decline in fertility rate. Education, on the other hand, enhances the skills and human capital development which is vital in technological advancement and employment creation. Also, through education, there is delay in marriage and first birth since girls spend more years schooling and this enhances access to information on family planning. Economic policies play a key role in creating employment opportunities through trade openness, capital accumulation, finance market development and macroeconomic stability.

Good governance provides the necessary institutions that help reduce corruption, enhance rule of law and ensure political stability, thus laying ground to protect the gains made in a country. There should be flexible labour policies on minimum wage, government pay practices, hiring and firing that encourage employers to take risks in investment. In order to realize demographic dividend, all policies should work in harmony since time is essential. If the policies are not implemented in a holistic manner, a country may not only miss on the demographic dividend but unemployment will be high, causing anti-social vices such as crimes and political instabilities.

Fertility rate decline is the most fundamental aspect for a country to realize demographic dividend since it leads to dependency ratio decline and a bulge of the working age population. Persistent decline in fertility rate continuously reduces the proportion of young population, which changes the age structure distribution. As the proportion of the population below 15 years reduces, the bottom tends to thin while a large proportion of the population moves to the age above 15 years, which is the working population (Figure 1.2).

**Figure 1.2: Age Structure distribution before and after fertility rate decline**



Source: NCPD (2013)

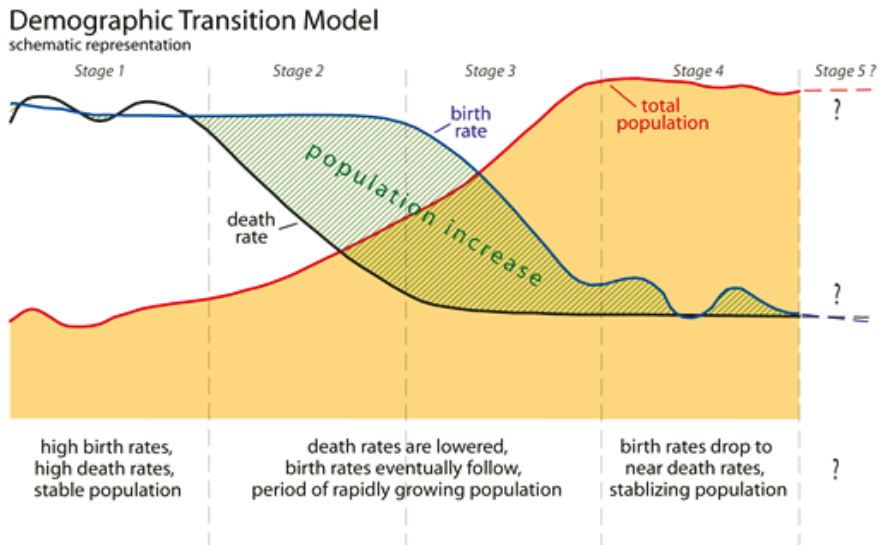
### **1.3 Demographic Transition and Demographic Dividend**

Demographic transition is the process by which a country moves from high to low rates of births and deaths, resulting to population growth in the interim (John, 2013). Fertility and mortality rates affect demographic dividend through their effects on the demographic transition process. Demographic transition in any country goes through four stages as shown by Figure 1.3. In the first phase, both fertility and mortality rates are high, making the total population relatively stable. At this stage, the health service provision is poor, resulting to high mortality that cancels the high birth rate leading to the total population remaining stable. The second phase sees an improvement in health services and nutrition that reduces the mortality rate and since the birth rate is still high, there is an increase in total population. In phase three, the birth rate is declining due to family planning intake while death rate is at its lowest. There is increase in total population and the largest proportion of working age population is realized at this stage, leading to the first demographic dividend, if the essential conditions are available.

In the fourth phase, there is further decline in fertility rate resulting to population growth stagnation or even a negative growth with high old age population. Countries in this stage have achieved the replacement rate, resulting to stagnation of the total population. Replacement rate is the number of children each woman needs to maintain current population levels, implying zero population growth (Haupt et al., 2011). Beyond the fourth stage and depending on governance, infrastructure, trade, and labour, a second dividend can be realized if the population age (64 years and above) becomes economically productive. The decline in dependency ratio leads to accumulated wealth during the working period which the elderly can use as they enjoy higher life expectancy due to improved health. As a result, the elderly are able to support themselves instead of being dependants, leading to a second dividend.

World over, the demographic transition varies between regions and countries. Most of the developed countries have gone through the four phases, with some experiencing declining labour force since fertility rate has dropped below the replacement rate (NTA, 2013). In 2012, countries such as Germany had 20 per cent of the total population aged above 65 years while Italy achieved the same in 2007 (European Commission, 2014). The less developed countries (Sub-Saharan Africa) are at different phases with some having a decline in mortality and birth rates and moving through the second and third stages, though at varied rates (Eastwood and Lipton, 2012). Kenya is in the second stage of the demographic transition as shown in Figures 1.3 and 1.4.

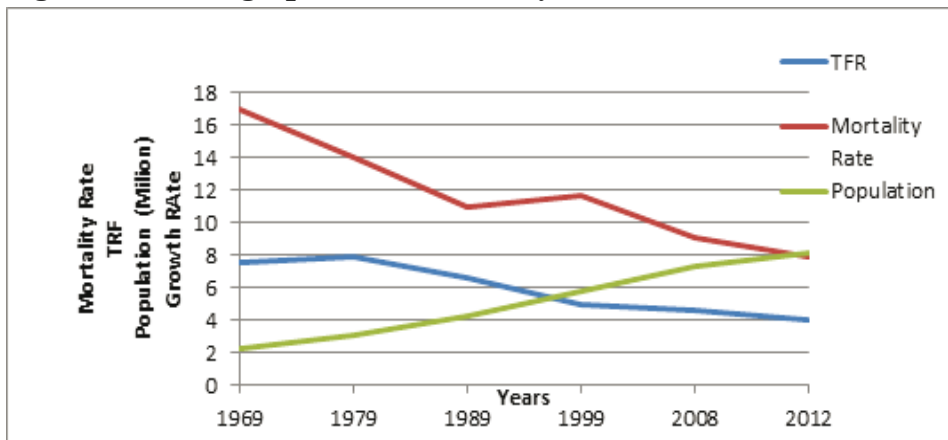
**Figure 1.3: Demographic transition**



Source: Population Reference Bureau (2013)

Kenya has been undergoing demographic transition for more than 50 years (NCPD, 2013). As shown in Figure 1.4, mortality rate decline started in 1969 while fertility rate started in 1979, reaching a low of 3.97 in 2012. The period also recorded growth in total population. The decline in both mortality and fertility rate is attributed to investment in health, family planning and education.

**Figure 1.4: Demographic trends in Kenya**



Source: NCPD (2013)

#### **1.4 Problem Statement**

Managing rapid population growth and spurring economic growth at the same time are some of the key policy challenges facing Sub-Saharan Africa (Bloom et al., 2013). In Kenya, fertility rate is high standing at 4 in 2014, resulting to high population growth. This has culminated into high level of children (0-14 years) and youth (15-34 years) who constitute 43 and 35.2 per cent of total population respectively, implying that more than three quarters of the population is aged below 35 years. As a result, the country has a very high dependency ratio of 76.8 per cent which limits the country's ability to save in order to invest for economic growth. The government is committing a lot of resources towards child care, through education and health at the expense of economically productive sectors. Further, there are high unemployment levels in the country, mostly affecting the youth.

The Kenya Economic Report (KIPPRA, 2013) notes that open unemployment in the country is 8.6 per cent while youth unemployment is 10.4 per cent. However, these figures do not consider the nature of employment, with high levels of under-employment being noted while 82.7 per cent of the jobs were in the informal sector and small-scale agriculture and pastoralism. The Medium Term Plan II recognizes that some non-bureau sources put the youth unemployment rate as high as 25 per cent. The high population growth has made the unemployment situation worse due to the high dependency ratio, where resources which otherwise would have been channeled to productive sectors are spent for non-productive purposes.

Through Economic Recovery Strategy, MTP I and MTP II, the government has initiated several interventions to create employment, mostly targeting the youth without much success. They include Kazi Kwa Vijana, Youth Enterprise Development Fund, Uwezo Fund, Access to Government Procurement Opportunities and Rebranding of National Youth Service. Unemployment among the youth leads to frustration and deprivation. In the recent past, the country has been experiencing high levels of insecurity, drug abuse, alcoholism, radicalization and terrorism which are partly blamed on youth unemployment and frustration. The Arab uprising was blamed to, among others, youth unemployment and desperations. There is, therefore, great need for the government to come up with policies that will economically engage the large population and also reduce the dependency ratio, hence reap from demographic dividend.

## **1.5 Objective**

The overall objective of the study is to assess how the population dynamics affect the country path towards the realization of demographic dividend as a way of taking advantage of the high population, especially those aged below 35 years.

The specific objectives are:

- (i) To estimate the effects of working age population, dependency ratio and fertility rate in achieving demographic dividend in Kenya; and
- (ii) To make policy recommendations.

## **1.6 Research Questions**

The research questions are:

- (i) What would be the expected effects of working age population on realizing demographic dividend?
- (ii) What would be the expected contribution of fertility rate decline in realizing demographic dividend?
- (iii) What would be the expected effect of dependency ratio decline?

## **1.7 Justification of the Study**

Demographic dividend provides one of the avenues where a country can economically benefit from a large population. The high population in the country means that the country stands a chance to benefit from demographic dividend. However, there are several essentials that the country must meet to achieve this, among them change in the country's population dynamics. To address this, there is need to assess how these dynamics affect the harnessing of demographic dividend. It is important to understand how the working age, dependency ratio and fertility rate, among other dynamics, affect the country's path towards reaping demographic dividend. Further, there is need for the government to explore all possible avenues in order to address youth unemployment which is being blamed for the high cases of radicalization, terrorism and insecurity.

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## **2. Literature Review**

### **2.1 Theoretical Framework**

This study is based on economic growth model which gives the relationship between population and economic growth. According to Bloom (1998), demographic dividend emanates from the relationship between population and economic growth through the population growth theories. The debate on the relationship can be represented in three main theories; the Neutralist, Pessimist and Optimist (Bloom *et al.*, 2003). The neutralist theory argues that population growth has a neutral effect on economic growth, which was advanced from Adam Smith 1776 view that it is the division of labour that counts in economic growth. The pessimist theory, borrowed from Malthus 1798 theory of population growth states that population growth restricts economic growth. It argues that as population increases, demand for the fixed resources also increase while a large part of investment is used to meet the needs of the growing population stifling economic growth. Malthus (1898) argued that an increase in population would lead to competition for the fixed resources, which would eventually diminish negatively, thus affecting economic growth. The theory further argued that time would come when the resources will not support any more population leading to starvation and death. Enrich (1968) in support of the theory argued that by 1970, hundreds of millions of people will starve to death due to population bomb which could not be supported by the available resources.

The third theory argues that population growth has positive economic impact, and it treats population growth as an economic asset through human capital. This theory has gained a lot of momentum in the recent past, and it is supported by the fact that in the last 30 years, the world population has doubled while per capita income has increased by around two-thirds. It is through the optimist theory that demographic dividend is realized and, therefore, the focus of this study. Kuznets (1967) argued that population growth creates higher demand for goods and services while technological advancement enhances optimal utilization of the fixed resources. The population pressure on resources has forced people to be innovative and embrace technological advancement so as to meet the increasing demand, hence positively contributing to economic growth. As the population grows, it reaches a time when the share of working age population is large compared to the other. If appropriate policies are put in place, they create employment opportunities leading to accelerated economic growth, and therefore demographic dividend.

## **2.2 Empirical Literature**

Cincotta *et al.* (1997) noted that there is a correlation between population and economic dynamics. The study found that the fertility decline of 1970s and 1980s led to the high economic growth realized in 1980s and 1990s in the East Asian countries of South Korea, Taiwan, Singapore, the former Hong Kong Territory, Thailand, Indonesia and Malaysia. The increase in number of working age population compared to the dependent children reduced the dependency ratio, leading to rapid growth in domestic savings. In order to benefit from the population change, the governments put in place modern institutions that ensured competitive markets, flexible public policies, and well-run government programmes which helped the government to adjust to the population changes. The study also found that in developing countries, there is stressed relationship between population and economic growth due to high dependency ratios. This was mainly due to high demand for child and health care and the high number of youth joining the labour market compared to the jobs being created.

Barro (2004) found the initial per capita GDP has an inverse relationship with growth of per capita GDP. In order to realize this growth, the level at the end of a period should be higher than the initial level. An initially lower level of per capita GDP would lead to a higher growth rate compared to a higher one, hence inverse relationship.

Phang (2005) analyzed the labour force transformation role in achieving demographic dividend in the Republic of Korea. The study found that there were rapid demographic changes with total fertility falling from a high of 6.0 in 1950s to 2.0 by 1990, contributing to economic growth and social development. The demographic transition had a significant effect on investment in human capital, with education level increasing from an average of 6 to 12 years while the wage premium of higher education increased. The government created the necessary policy environment through increased flexibility in the labour market which allowed expansion of the labour force, created adequate saving mechanisms, and provided good health and high-quality education. The policies led to delays in marriage and first birth, especially among the educated population and increased savings and, investment, and fall in dependency ratio. The miracle economic growth of Korea is attributed to the rapid growth of human capital stock for the three decades of 1960s to 1980s. The demographic transition period is expected to last about 70 years when the population will grow rapidly old from 2020 leading to the challenge of low working force in the country.

Shakoori (2005) examined the Arab countries and noted that for them to benefit from demographic dividend, they need to ensure the youth bulge is



economically productive. Through investment in education, good governance and integrating into global market through cheap imports, there will be increase in exports and capital inflows. The labour market should ensure that the maturing population is absorbed actively to avoid countries experiencing a crisis associated with unemployment such as terrorism.

Wongboonsin (2007) assessed Thailand demographic change and demographic dividend and noted that the ability to take advantage of the demographic situation is related to human resources and other economic policies. After the fertility rate decline, the government should put in place measures that improved its productivity through quality education, appropriate macroeconomic policies, financial system reforms, encouraging older people to remain in labour force and developing regional labour market. The policies enhanced productivity and savings while reducing the dependency ratio, resulting into demographic dividend.

According to Talljaard (2008), the long-term decline in fertility rate is the most important aspect that sets in the demographic dividend. He found that family planning plays a key role in reducing fertility rate while empowering women through education; economically, it tends to delay the first birth, marriage and also improve access to family planning. This depends on an enabling environment and policies put in place by the government, such as the economic policies on trade and labour, good governance and education. The study found that for South Africa to create a future for its country, it must invest in its large youth population and make them economically productive through education and creating jobs. Through good governance, there is reduction in corruption, promotion of rule of law, investor confidence and a peaceful environment to work in, which boosts economic growth.

Carvellati (2009) looked at causal effect of life expectancy on economic growth. Carvellati found that individuals' education and fertility decisions depend on their life expectancy. As a country moves through the demographic transition, improvement in life expectancy reduces population growth and fosters human capital accumulation, leading to an increase in human capital and per capita income. The study predicted that before population transition starts, a rise in life expectancy increases population size, which reduces per capita income. However, when the transition sets on, life expectancy leads to decline in population size, thus increasing per-capita income.

Leahy *et al.* (2010) examined how age is structured within a population, why it matters and how the government can influence the age structure. The study was done in Nigeria, Pakistan, Mexico, Tunisia, Germany and South Korea. The analysis presents evidence that certain age structures can support government efforts in creating a stable country, and avoiding civil conflict. Countries with

very young and youthful structures were more likely to suffer from development and security set-backs, and were three times more likely to experience civil war compared to those with mature age structure. Those with a high proportion of mature age structure realized low economic growth rate, with no cases of civil conflict. However, in countries where the government was able to take advantage of the large proportion of working force, they experienced an average annual economic growth of 3.6 per cent attributed to reduced dependency ratio.

The window of opportunity for the demographic dividend occurs once fertility rates have steadily declined for about 30 years (Global Leaders Council, 2011). This reverses the trend of dependency ratios, and there is higher income generating working population relative to the number of old and young people who depend on them for support. These demographic changes have several economic implications. First, the relative size of the labour force increases as the share of children within the population declines. In addition, women are more likely to enter the workforce when they have smaller families. With a larger labour force, the economy can potentially become more productive. The government must invest more in human capital development, health, education and training population. Healthy and skilled workers are more productive in an economy.

Thuku et al. (2013) analyzed the population change impact on economic growth in Kenya for the period 1963 to 2009. The study used vector auto regression estimation on time series data and found a long-term relationship with positive correlation, meaning population increase will have a positive impact on economic growth. This implies that Kenya's population growth promotes economic growth. It also found that there was a mutually reinforcing bilateral causality between population and economic growth where the causality was running in both directions. According to the study, Kenya is in the second phase of demographic transition. Therefore, population is driving economic growth in Kenya though there is need to come up with a well-managed population expansion policy to ensure that population and the economy complement each other.

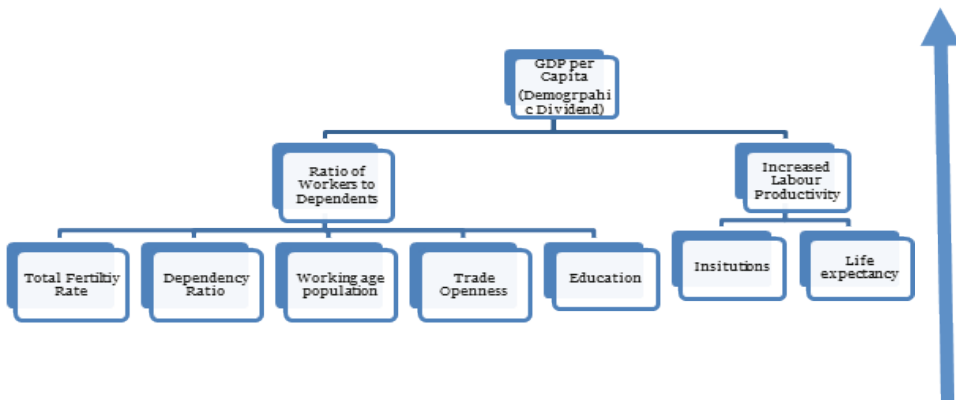
Thailand recorded a rapid decline in fertility rate from 5.5 to 2.2 in two decades (between 1970 and 1990), the fastest in East Asia (UNFPA, 2011). The government investment in education, health and related policies led to changes in age structure, education and skills, state of health and geographical distribution. Contraceptives uptake increased from 15 per cent in 1970 to more than 70 per cent in 1987 with a decline in family size being recorded, and delay in marriage. Also, single women aged 50-54 increased from two per cent in 1960 to eight per cent in 2010. However, there were increased cases of abortion and teenage pregnancy, necessitating a national reproductive health policy. There is an emerging challenge of rapid aging population and an ultra-low fertility rate of 1.5 which affects the labour force both

now and in the future, although the ageing population is benefiting from improved material well-being.

### 2.3 Conceptual Framework

As indicated in the literature, decline in total fertility rate is necessary in order to reduce the population growth. However, this condition alone is not sufficient for a country to realize demographic dividend. Provision of education will ensure human capital development for the high working population by provision of necessary skills needed by the market. By enhancing trade-openness, the country will create more market and availability of goods and services. The role of institutions is key in providing a conducive environment for a working and fair system, where there is no wastage of resource, no corruption and justice is done. Life expectancy enhances the population productivity. When the working age is economically engaged, coupled with a decline in fertility rate, it results into a fall in dependency ratio and also increased labour productivity. This culminates into high income per capita and the realization of demographic dividend.

**Figure 2.1: Conceptual Framework**



### **3. Methodology**

#### **3.1 Model Specification**

The demographic dividend was measured by the per capita GDP as used by Bloom (2007). This was done by assessing the growth of the per capita output in a country, attributable to change in population.

Bloom (2007) gave the basic relationship between demography and economic growth to get per capita GDP as follow:

$$PGDP=Y/P.....(1)$$

To get the change in per capita GDP at any particular period, we borrow the economic growth model used by Barro and Sala-i-Martin (2003) as used by Bloom et al. (2007). The model indicates that the per capita income change in period  $t(\Delta y_t)$ , depends on the initial per capita GDP ( $y_{t-1}$ ) and other variables. This takes the functional form of:

$$\Delta y_t=f(y_{t-1},.....)(2)$$

The per capita GDP is expressed in logs and the specific equation is expressed as:

$$\Delta y_t=\log y_{t-1}+WA+TFR+LEXP+DR+Edsec+OPN.....(3)$$

where:

Dyt	Growth of GDP per capita
Log $y_{t-1}$	Previous per capita
WA	Share of working age population
TFR	Total fertility rate
LEXP	Life expectancy at birth
DR	Dependency ratio
Edsec	Secondary school enrollment
OPN	Trade openness

#### **3.2 Data**

The study used time series data for a period of 44 years (1970 to 2013). The working share of population was computed from the Kenya National Bureau of Statistics (KNBS), and the trade openness was computed from imports, exports and GDP which were obtained from the economic survey reports. The primary school enrollment, life expectancy, dependency ratio and total fertility were

obtained from World Bank database.

<b>Variable</b>	<b>Expected Sign</b>	<b>Data Source</b>
Growth of GDP per capita	Dependent variable	KNBS
Previous per capita	-ve	KNBS
Share of working age population	+ve	KNBS
Total fertility rate	-ve	World Bank
Life expectancy at birth	+ve	World Bank
Secondary school enrollment	+ve	World Bank
Dependency ratio	-ve	World Bank
Trade openness	+ve	Computed from Export, Imports and GDP (KNBS)

## 4. Estimation Results

### 4.1 Descriptive Statistics

Table 4.1 shows the descriptive statistics which include number of observations, mean, standard deviation and the minimum and maximum values of the variables. The average working age population share is 0.49, an indication that almost half of the total population is in the labour force, hence the need for more job opportunities. Total fertility rate mean is 6.1, which is high compared to a replacement level of two, necessitating the need to enhance family planning uptake. In addition, the average primary school enrolment rate is 39.5, with a high standard deviation, implying a wide spread between the years. During the period, the average dependency ratio was 99, indicating that the working age population had a high population to support. Life expectancy averaged 56 years while trade openness is 0.6.

**Table 4.1: Unit root tests**

Variable	Observations	Mean	Std. Dev.	Min	Max
Year	44	1991.5	12.8452	1970	2013
Change in per capita GDP	44	0.0114	0.0347	0.0572	0.1363
Previous per capita GDP	44	32819.2	2964.249	24892	39621
Working age population share	44	0.4993	0.0344	0.4312	0.5446
Total fertility	44	6.1126	1.2691	4.4593	8.0813
Secondary school enrolment	44	39.5665	12.7992	25.3252	71.3215
Life expectancy	44	56.6515	2.6620	52.2333	61.5254
Trade openness	44	0.6115	0.0743	0.4785	0.7746
Dependency ratio	44	99.6985	12.6385	81.4917	112.7754

### 4.2 Normality and Correlation

The study tested for normality and, as shown in Appendix 2, it is normally distributed with skewness range of 0.0464 to 0.8679. The correlation between the variables is as shown in Appendix 3.

### 4.3 Unit Root Test

The study examines the stationarity of the variables by testing for unit, root using the Augmented Dick-Fuller. Time series data is known to have a stationarity problem which made it important to test for the same. The results show that GDP per capita growth, life expectancy, and openness are stationary at level while the other variables are integrated of first order. The results show that the eigen value is less than one with values of trace reducing up to  $r=5$ , which is not equal to zero.

**Table 4.2: Unit root tests**

ADF test at level (Null Ho: series non-stationary)					
Variable	Critical t	1%	5%	10%	p-value
GDP per capita growth	2.950	3.655	2.961	0.0398	0.039
Log life expectancy	-3.024	-3.648	-2.196	-2.321	0.032
Openness	-2.609	-3.634	-2.952	-2.610	0.091
ADF test at first difference					
LnGDP	-3.039	-3.662	-2.964	-2.614	0.031
Share of working age population	-2.825	-4.562	-3.542	-2.542	0.054
Total fertility rate	0.532	-3.648	-2.958	-2.612	0.085
Secondary school enrolment	-4.253	-3.124	-2.923	-2.0125	0.000
Dependency ratio	-0.412	-3.655	-2.961	-2.613	0.048

### 4.4 Estimation Results

Long run and short run regressions were done although the results presented in this study are for the short run, only since the main purpose for the long run regression was to generate the residual. The results of short-run regression with dummy variable are shown in Table 4.3. A dummy was introduced to separate the period before and after 2002 due to the major political and economic changes experienced in the country. Zero represented the period before 2002, while one was otherwise. In 2003, an Economic Recovery Strategy (2003-2007) was formulated which saw the economy grow from 0.6 per cent in 2002 to 7.1 per cent in 2007, although the growth slowed down from 2008 due to several shocks that affected the economy. The shocks include: the 2007/08 post-election violence, drought, the global financial and economic crisis, and high international oil and food prices. The change in governance and economic policies were attributed to major changes compared to the period before 2002. The period between 2003 and 2009 saw several policy interventions being introduced, including Economic

Recovery Strategy 2003-2007 and Vision 2030, which is being implemented through five year Medium Term Plans. So far MTP I (2008-2012) and MTP II (2012-2017) have been implemented (Government of Kenya, 2013). The results show a positive dummy coefficient of 0.152795, which implies that the two periods before and after 2002 had an effect on the country's economic growth.

The results show that there is a positive relationship between the share of working age population and change in per capita income, a measure for demographic dividend. A one per cent increase in share of working age population will increase per capita income by 0.238764, holding all other factors constant. This means that there is a positive correlation between population change and economic growth in the country, and an increase in population will have a positive effect on economic growth. This implies that the country has an opportunity to realize higher economic growth, with increase in working age population, hence the chance to realize demographic dividend if the jobs are created to absorb the labour force.

The total fertility rate was significant and has an inverse relationship with demographic dividend. A one percent decline in total fertility rate leads to 0.01872 increase in per capita income. This underpins the importance of a low level of fertility rate which reduces the youth dependency ratio in a country. Therefore, the country should implement policies that will reduce fertility rate.

The level of education is important in achieving demographic dividend in the country. A one per cent increase in secondary school enrolment rate increases per capita income by 0.0356412. Education is an important human capital development to the youth and working age population, enabling them to be economically productive. Higher education level is a catalyst to technological advancement, innovation and inventions that provide better utilization of the limited resources.

The dependency ratio results show an inverse relationship, implying that a decline in dependency ratio enhances the realization of demographic dividend. This is mainly through its contribution to enhanced savings which are much needed for economic investment. The positive relationship in trade openness implies that the country should enhance movement of goods and services in order to expand the international market.

The error correction term (ECT) coefficient indicates that 58 per cent of the deviations from the long run equilibrium were corrected.



**Table 4.3: Short-run regression results**

<b>Independent Variable</b>	<b>Growth of per capita GDP</b>
Constant	2.867912 (1.0462058)
DLogarithm of previous GDP per capita	-.08542156** (.1256568)
DLogarithm of working age population share	.238764** (.6854547)
DTotal fertility rate	-.01872*** (.1096845)
DSecondary school enrolment	.0356412** (.1568548)
Logarithm of life expectancy	.15632465*** (.3987514)
Openness	.0286541** (.1586454)
Dependency ratio	-.0398642*** (0.256487)
Dummy	.152795 (.106482)
ECT(-1)	-.5861354* (.2149864)
Test summary	
RSS	.5852463
R-squared	0.52556
F-statistics	1.47
Prob (F-statistic)	0.1385
Levels of significance *1%, **5%, ***10%	
The standard errors are given in brackets	

## **5. Conclusion and Policy Recommendations**

### **5.1 Conclusion**

The purpose of this study was to assess the effects of population dynamics as Kenya strives to achieve demographic dividend. Demographic dividend is measured in terms of per capita income. This was done by analyzing the effect of various population dynamics on per capita income. The findings of the study show that the country stands a chance to reap from demographic dividend if a conducive environment is provided to economically engage the high proportion of the working age population. This implies that population growth has a positive impact on economic growth in the country, reinforcing the optimist theory that population growth has a positive effect on economic growth.

The findings show that the effects of population variables are important in influencing economic growth. Fertility rate and dependency ratio negatively affect economic growth, hence the need to put policies that contribute towards their reduction. However, life expectancy, trade openness and school enrolment were found to have a positive impact on per capita income. Therefore, the large working force should be supported to ensure a larger, healthier and better-skilled work force. Further, a conducive environment should be created to ensure that the educated and skilled labour force is able to utilize its skills and create employment opportunities, hence economic growth, and ultimately harnessing the demographic dividend.

Realizing demographic dividend is not automatic in any country, and there is need to ensure that appropriate policies are put in place and on a timely basis. A large working age population is necessary, though not sufficient, which calls for a holistic age-specific approach that provides the essential policy environment. There is need for the government to work towards fertility rate decline so as to reduce the dependency ratio which enhances savings needed for investment by the working age group. However, the fertility rate should be managed at around the replacement rate of two in order to avoid a scenario of ultra-low rates that will negatively affect the labour force. Through education, there is enhanced skills development which is critical in technological advancement, innovation and employment creation. It also raises the number of average years spent in schooling that tend to delay marriage and first birth while enhancing access to family planning information. Trade openness ensures trade liberalization which expands the market for both products and inputs. Considering that 78 per cent of Kenya's population is aged below 35 years, there is need to develop policies that are holistic and age-specific to this group. Working towards employment creation for this age group should be the priority focus of the government, since the group is more vulnerable to frustrations that can lead to crisis.

## 5.2 Policy Recommendations

In order for the country to reap from the demographic dividend, the government needs to adopt and implement holistic age-specific policies, especially for children (0-14 years) and the youth (15-34 years). The policies should be geared towards providing an accelerated economic growth to absorb the high population and also control the population growth. There is need for the government to give maximum attention to the population aged below 34 years which constitutes more than three quarters of Kenya's population. Indeed, the government should treat it like a project by ring fencing the 0-35 years population. This study proposes 'project 034' to highlight the need to address issues affecting large population aged 0-34 years.

The fertility rate should be reduced to around two (2) which is the replacement ratio by scaling up contraceptive uptake and provision of information, promoting behavioural change on contraceptives use, and robust sensitization on benefits of small family sizes. This should be done through the devolved institutions, especially county governments. The specific policies should focus on:

### **The young (0-14 years)**

This age-group consists 43 per cent of the total population, most of whom are in school. The policies should:

- Improve the quantity and quality of schooling in order to raise the average years of schooling through expansion of primary and secondary school to raise enrolment, especially for girls, and also ensure minimum standards. Introduction of motivational programmes in schools to boost the morale of students and ensure that education is relevant to the skills needed in the labour market;
- Improve child health to increase survival and life expectancy, which encourage families to have small size families; and
- Prevent early marriage through advocacy and ensure stringent enforcement of laws, expand rescue centres for girls, and provide incentives for them to join and complete school.

### **The youth (15-34 years)**

This group is mostly affected by unemployment and it calls for multi-sectoral approaches that combine efforts of various government departments to enhance youth skills and opportunities. The policies should focus on:

Enhancing market driven employment creation policies; flexibility in hiring and job mobility; encouraging private sector investments; and trade openness. In

addition, the following should be done:

- Establish an elaborate marketing system for youth products and services which should incorporate private sector participation;
- Set up and operationalize technological and industrial hubs targeting the youth;
- Provide incentives such as subsidized inputs, tax waivers and other preferential treatment to enhance competitiveness of their products and services;
- Promote development and marketing of agri-business;
- Improve the quantity and quality of secondary, tertiary and university education by expanding the learning institutions, enforcing on minimum standards of quality, and ensuring they provide skills and technology relevant to the changing job market;
- Expand and equip youth polytechnics and youth empowerment centres which can also serve as value addition centres;
- Reward innovation and ensure intellectual property rights to encourage the youths; and
- Promote youth innovations and credit access, including counties.

### **5.3 Limitations of the Study**

Data availability was a major challenge, especially on institutions, technology and average years of schooling. Institutions have a major bearing in achieving demographic dividend, since they are a measure of how the government ensures rule of law, fighting corruption among other governance issues which affect a country's investment environment. Technological advancement was a very critical variable since it would have provided a measure of how the population is adjusting to the changing demands for the limited resources and employment creation. The average years of schooling are more inclusive compared to primary or secondary school enrolment rate. The study would have been more comprehensive if it was able to capture the political goodwill, considering that in Kenya, high fertility rate is perceived as a rich source of votes.

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## Appendices

### Appendix 1: Co-integration Test

Johansen tests for co-integration					
Trend: constant				Number of obs = 42	
Sample: 1972 - 2013				Lags = 2	
5%					
rank	parms	LL	eigenvalue	trace statistic	maximum critical value
0	56	193.33661	.	304.3486	124.24
1	69	255.43911	0.94804	180.1436	94.15
2	80	287.7329	0.78515	115.5560	68.52
3	89	313.5017	0.70685	64.0184	47.21
4	96	328.51704	0.51082	33.9877	29.68
5	101	339.52924	0.40808	11.9633*	15.41
6	104	344.78113	0.22127	1.4595	3.76
7	105	345.51089	0.03415		

### Appendix 2: Skewness/Kurtosis Tests for Normality

----- joint -----					
Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi <sup>2</sup> (2)	Prob>chi <sup>2</sup>
year	44	1.0000	0.0018	8.37	0.0152
growthofgd~a	44	0.0464	0.0257	7.82	0.0200
previousgdp~a	44	0.3255	0.0769	4.23	0.1204
workingage~e	44	0.7960	0.0000	17.59	0.0002
totalferti~e	44	0.4157	0.0000	29.12	0.0000
enrolmentr~e	44	0.2387	0.5977	1.76	0.4145
lifeexpect~y	44	0.8679	0.0003	10.94	0.0042
openess	44	0.3541	0.3351	1.89	0.3883
dependency~o	44	0.3861	0.0000	50.43	0.0000
dummy	44	0.0025	0.3443	8.61	0.0135

### Appendix 3: Correlation

	growth~a	initia~a	workin~e	totalf~e	enrolm~e	lifeex~y	openess	depend~o
growthofgd~a	1.0000							
previousgdp~a	-0.2898	1.0000						
workingage~e	-0.1086	0.7071	1.0000					
totalferti~e	-0.1230	-0.7232	-0.9673	1.0000				
enrolmentr~e	-0.0457	0.8390	0.8928	-0.9135	1.0000			
lifeexpect~y	-0.0664	0.5991	-0.0014	-0.0969	0.3784	1.0000		
openess	0.0859	0.2451	0.3539	-0.3107	0.3514	-0.0525	1.0000	
dependency~o	0.0035	-0.5962	-0.9572	0.9279	-0.8811	0.0945	-0.3988	1.0000