KIU Journal of Social Sciences Copyright©2021
Kampala International University ISSN: *2413-9580*; 7(3): 65- 74

Demographic Changes and Economic Growth of Sub-Sahara Africa: A System GMM Approach

ANIEKAN O. AKPANSUNG
Modibbo Adama University, Yola, Nigeria

AMADE PETER
Adamawa State University, Mubi, Nigeria

Abstract. Empirical evidences show that the relationship between demographic dynamics and economic growth is mixed and controversial. This study investigates the impact of demographic changes on economic growth of sub-Sahara African (SSA) countries using annual data between 1980 and 2019. The results based on System Generalized Method of Moments (SGMM) estimation technique revealed that urbanization rate and aging-population (65 + years) have positive and significant impact on economic growth of SSA countries, while unemployment rate exerts a significant negative impact. The study concludes that urbanization is very significant in reducing unemployment in the rural areas and promoting economic growth, therefore its importance should not be exaggerated. The study recommends that SSA countries should put urbanization at the heart of their socio-economic policies and programmes so that it can extend economic opportunities and potentials to the rural areas, which will serve as impetus for rapid economic growth of the SSA countries.

Keywords: Demographic change, Economic growth, SGMM, Sub-Sahara Africa

1. Introduction

The regions and countries of the world have continued to experience dramatic demographic changes over the years, and their effects on economic growth rates have continued to vary as well. Demographic change results from the combined effects of fertility, mortality, and migration flows. The development of these three variables determines a nation's age composition and population size (Barras & Groth, n.d). The majority of the countries with the highest population growth rates are relatively poor countries and regions of the world. Sub-Saharan Africa registered highest growth rate while Europe is the lowest. Sub-Saharan Africa changed from 7.4% of world population in 1950 to 12.4% in 2010, while Europe declined from 22% to 11% in the same time period (Gene, Wang & Yan-Lin, 2017). Africa's youth population is expected to continue to grow throughout the remainder of the 21st century, more than doubling from current levels by 2055 (United Nations, 2015). More so, sub-Saharan Africa's working-age population is projected to more than triple, and by 2050 it will be the only major region in the world with a growing working-age population. According to The Economist (2020), sub-Saharan Africa's population is growing at 2.7% a year, which is more than twice as fast as South Asia (1.2%) and Latin America (0.9%). That means Africa is adding the population of France (or Thailand) every two years. . In 2020, the total population of sub-Saharan Africa amounted to approximately 1.14 billion inhabitants (O'Neil, 2021).

As noted by Lam, Leibbrandt and Allen (2019), these striking demographic trends present both an opportunity and a challenge to African policymakers and stakeholders. For instance, although monetary policy cannot affect the growth rate of potential output or the long-run natural rate of unemployment, it would take demographic changes into account as part of the economic environment, and would consider the downward pressure demographics put on both relative to their historical levels (Mester, 2017). Changes in demographics could also affect the transmission mechanism of monetary policy to the economy, in particular, the strength of wealth effects versus income effects. Older people tend to hold

more assets than the young and tend to be creditors while drawing down their assets to fund their consumption during retirement. As the share of the population shifts from young to old, the propagation of an interest rate change through the economy is likely to change. Demographic change may mean that wealth effects become a more important channel through which monetary policy affects the economy (Bean, 2004; Imam, 2013). Again, older people tend to save less because once people reach retirement age, they need to draw down their savings and perhaps sell assets to fund their retirement. This countervailing effect from dissaving, as well as public spending on retiree benefits, would tend to put upward pressure on interest rates (Mester, 2017). Goodhart and Pradhan (2017) argue that demographic change will lead to increases in the equilibrium interest rate.

SSA countries have a unique trend of demography which contrasts sharply to what is obtainable across the globe. Africa is experiencing a slow and in several cases, stalling demographic transition. This makes Africa's population the most rapidly increasing in the world currently with an estimated population of 1.13 billion as at 2020 (World Bank, 2020). Consequently, the population is presumed to impede the rate of economic growth of SSA countries. However, this is just a mere conjecture as there are several countries with high population and high economic growth rates, such as Brazil, Russia, India, China and South Africa (BRICS). It is obvious that the population structure of Africa is different in several aspects from those of other countries due to slow demographic transition- high dependencies, low life expectancies, high fertilities and mortalities. Perhaps this makes it difficult for Africa to benefit from the impact of changing age structures of the population on economic growth which results mainly from demographic transition (Schoch & Lakner, 2020).

Another concern about the demography of SSA is the increasing heterogeneity among countries of SSA. This makes the population dynamics of the region to be different from others. The growing heterogeneity is a result of the diversity in the pace of progress, it is equally related to social policies such as health, education and family planning, socio-political history, environment, as well as the level of economic development of each country in the region. In the 1950s, for instance, South Africa and Mauritius had a 100% infant mortality rates, which ranged from 240% in Mali, Gambia and Angola. However, nowadays, it ranges from 30% in Cape Verde, Sao Tome and Principe, to close to 180% in Sierra Leone with rates between 90% and 110% in many countries. The probability of dying between 0-5 years varies currently from around 40% in other countries to almost 300% in Niger republic for a ratio of 1 to 7 (Tibutin, 2004).

Extreme poverty rate around the globe is facing a slow decline principally because of slow progress in SSA countries. While about 40% of the world is living below the US $2.00 per day threshold, SSA accounts for about two-thirds of this figure (Schoch & Lakner, 2020). The poverty rate in SSA has not fallen at a rate that is fast enough to match the population growth rate of the region. Therefore, this study is set out to examine the impact of some demographic changes on economic growth of 48 SSA countries between 1980 and 2019 using System Generalized Method of Moments (SGMM) approach.

2. Literature Review

2.1 Empirical studies

Several studies have been conducted on the impact of demographic changes on economic growth. Prominent among these, are the studies of Bloom and Williamson (1998), Bloom, Canning and Sevilla (2001), Navaneetham (2002); Bloom, canning and Finlay (2010), Ven and Smits (2011), Sundman (2011), Aiyar and Mody (2011), Bloom, Canning and Rosenborg (2011), Porsse, Stampe, Portugal and Almeida (2012), Tobing (2012), Bloom, Humair, Rosenborg, Sevilla and Trusell (2013), Golley and Tyers (2013), Hyung, (2013); Fu (2013); Kim and Lee (2014), Ahmed, Cruz, Go, Maliszewska & Osorio-Rodarte (2014), Joe, Dash and Agrawal (2015), Kasnauskiene and Michenevic (2015); Khan, Ellahi, Sheikh and Sheikh (2016), Le and Park (2020), Hu, Lei and Zhao (2020), Munir and Shahid (2021; etc.).

In Bloom and Williamson's (1998) study of East Asia during the 1965- 1990s, it was found that: "an increase of 1 per cent in the growth rate of the working-age is associated with an increase of 1.46 per cent in the growth rate of GDP per capita. … an increase of 1 per cent in the growth rate of the overall population (effectively, the dependent population, since the empirical specification holds fixed the growth rate of the working-age population) is associated with a decrease of 1.03 per cent in the growth rate of GDP per capita." (p. 435). This means that demographic transition contributed significantly to East Asia's so-called economic miracle. Generally, the model by Bloom and Williamson (1998) shows that economic growth is lower (higher) when the

working age population falls short (exceeds that) of the total population.

In a study of the Asian sub-regions from 1965-2015, Bloom et al. (2001) employed descriptive analysis and found that developing countries stand a chance to benefit from their youthful population. Ven and Smits (2011) found that the young and the old constitute burdens as opposed to the working age population who produce more than they consume. The study also found that a higher dependency ratio lowers savings and thereby investment and economic growth. An empirical report on the relationship between demographic change and economic growth in the European Union by Prskawetz and Lindh (2007) supported the argument that demographic factors matter for economic growth just as much as technological change, innovation and political/institutional explanations. The authors noted that population ageing is expected to put certain strains on social security expenditures such as pension, health and old-age care expenditures.

Using evidences from Indian states between 1961 and 2001, Aiyar and Mody (2011) found that the initial working age ratio and the growth of the working age ratio have positive impact on economic growth. In another study from South Asia, Bloom et al. (2011) found that for the period 1950 to 2010, the rate of variation in the demographic variables of the sub-region were different; likewise their impacts on the economic growth of the sub-region. In Japan, Sundman (2011) investigated the effects of the demographic transition on economic growth. The study found that the dependency ratio and life expectancy had significant negative effects on economic growth. The result confirmed that demographic change slows down economic growth in Japan and other rich countries where population ageing is faster than other developing countries.

Porsse, Stampe, Portugal and Almeida (2012) examined demographic change and regional economic growth in Brazil. The study adopted descriptive analysis, Pooled OLS and the fixed effects methods, and found that demographic changes determined regional income convergence in Brazil. Higher child dependency ratio lowered the per-capita income growth, while age dependency ratio led to the income growth. Also, Tobing (2012) investigated demography and cross-country differences in savings rate, using descriptive statistics and panel data regression analysis. The study found that demographic factors account for about 70% of the dispersion in the cross-country savings rates. Secondly, the fraction of income spent on child raising to a large extent determines the variation in savings.

Liu and Hu (2013) explained that theoretical model shows that the share of working-age population is positively correlated with economic growth, while birth rate has an adverse impact. Empirical evidence based on provincial panel data indicated that decrease in birth rate and increase of the share of the working-age population increased China's average annual per capita GDP growth rate by 1.19 and 0.73 percentage points, respectively. The two demographic changes contributed about 19.5% to economic growth in China between 1983 and 2008. In Asia, Song (2013) investigated demographic changes and economic growth using empirical evidences for the period 1965 to 2009. The study employed descriptive statistics and regression analysis, and found significant negative effect of total population growth on economic growth. On the contrary, the working age population was found to have a significant positive effect on economic growth in Asia. Both the young and aged populations were found to have negative effects on economic growth rates, however, the effects of the young population superseded the effect of the aging population.

In another study, Yoon, Kim, and Lee (2014) analyzed the Impact of demographic changes on inflation and the macro economy using a dataset covering 30 OECD countries for the period 1960 – 2013. The study found that population growth affected real economic variables on the negative side, though insignificant in many instances. The influence of population dynamics on fiscal policy variables was rather mixed. On the inflation side, population growth affected the inflation rate positively. Ahmed, Cruz, Go, Maliszewska and Osario- Rodarte (2014) investigated how significant was Africa's demographic dividend for its future growth and poverty reduction. The study was conducted empirically using the dynamic structural modeling framework, which allows for quantitative analysis of the possible magnitude of demographic effect under different assumptions. The study found that the contribution of the elderly dependency ratio to savings was constant over time for SSA, while that of the youth dependency ratio as a share of GDP was two to three times greater than that of the elderly. The study also found that the dividend from this could account for about 0.37 to 0.42 percentage points of average annual real GDP per capita growth between 2011 and 2030, which is equal to 11 to 15 percent of GDP volume growth. It estimated that this demographic dividend could also account for 40 to 60 million fewer poor by 2030.

Similarly, Joe, Dash and Agrawal (2015) investigated demographic transition, savings and economic growth in China and India, using the Autoregressive Distributed Lag (ARDL) model, The findings suggested that the contribution of the reduced dependency burden to overall per-capita GDP growth during the period of study was about 2 - 2.5% per annum for China and between 1-1.5% per annum for India. China was also found to have a significant association between savings and dependency ratio.

In their study of the European Union, Kasnauskiene and Michnevic (2015) examined the effects of demographic trends on economic growth from 1996 to 2013. Their study adopted descriptive statistics as well as the panel data estimation techniques – the fixed effects model. They found that if there is a 1% increase in the shares of the 30-34 age cohort of the population, the rate of real GDP growth will be 0.18%, while, an increase by 1% in the 80 -84 age cohort of the population decrease the growth rate of the real GDP by 0.36%. In yet another study on Pakistan, Khan, Ellahi, Sheikh and Sheikh (2016) investigated changing demographics and economic growth. The analysis of the data using times series estimation techniques revealed that total fertility and GDP contributed positively to increase in life expectancy, while labour force participation rate, population growth rate and gross fixed capital formation affected fertility in Pakistan.

Kim (2016) conducted a study on the effects of demographic change on GDP growth in OECD economies between 1951 and 2010. Using descriptive analysis, and panel data regression analysis. It was found that all things being equal, a 1 percentage point shift in the share of population aged between 40 and 64 to the age group 65 and above would reduce GDP growth by 0.47 percentage points compared to the world- wide growth estimates. The findings of the study revealed that demographic changes accounted for a significant portion of growth slowdown in several OECD countries in recent years.

Using the Difference Generalized Method of Moments (DGMM) on 67 developing economies across regions and income groups, Ahmad and Khan (2018) found that change in age-structure and human capital affected the regional and income groups of the economies by different magnitude and pace over the period of 1960-2014. Ogundari and Awokuse (2018) have also demonstrated that in SSA, the life expectancy as a measure of human capital augments the economic growth. The impact of age structures on the economic growth of fifty Three (53) African countries between 1980 and 2019 examined by Hassan, Akpansung and Amade (2020) using the dynamic panel estimation techniques of difference and system Generalized Method of Moments (GMM). The results based on the system GMM estimation techniques revealed that the young population and prevalence of HIV/AIDS on the working class had negative and significant impacts on economic growth. However, the working population, aging populations, life expectancy and fertility rates had positive impacts.

Le and Park (2020) used panel regression model and panel continuous threshold model to investigate the effects of demographic change on economic growth of OECD and non-OECD countries (consisting of 27 advanced economies and 44 emerging economies) over the period, 1981-2014. The result found a significant difference of impact of demographic change on the economic growth of OECD and non-OECD countries. In a study using a panel data of 172 countries for the period 1960 to 2019, Hu, Lei and Zhao (2020) found that aging population has a significant negative impact on economic growth. A one percentage point increase in the ratio of population aged 65 + can decrease economic growth rate by about 2.6 percentage points. In South Asian countries, findings from Munir and Shahid (2021) based on ARDL approach indicated that fertility rate and life expectancy affect economic growth positively, while increase in young dependency ratio reduces economic growth in the long-run. In the short-run, life expectancy was found to impact economic growth insignificantly, while young dependency ratio affected economic growth negatively and significantly.

The above empirical review have indicated that the impact of demographic structure and economic growth have been mixed. These mixed results might be due to differences in approaches of analysis, socioeconomic nature of the economies and stage of economic development.

2.2 Theoretical Framework

The theory of demographic transition was developed by an American Demographer, Warren Thompson in 1929. The demographic transition theory is a generalized description of the changing pattern of principal demographic variables such as mortality, fertility and growth rates as societies move from one demographic regime to another. Basically, it implies a transition from trends of high birth and death rates to one of low birth and death rates. The transition from high birth and death rates is attributed to socio-economic advancement of a country or region from a

pre-industrial to an industrial setting (Woods, 2000; Caldwell, Bruce, Caldwell, Peter & Thomas, 2006).
The demographic transition model presents four stages or phases in which every country must pass through by proceeding from one stage to the other. The first stage is characterized by socio-economic backwardness, pre-industrial society, poor scientific advancement and technological inertia. The stage is characterized by high death rates and birth rates which are roughly in balance (Kirk, 1996)

In the second stage of the demographic transition, countries are characterized by socio-economic advancement and significant improvement in science and technology especially medical science. In this stage, there is a significant level of economic development. Death rates drop quickly due to improvements in food supply and sanitation, which increase life expectancies and reduce disease. The improvements specific to food supply typically include selective breeding and crop rotation and farming techniques (Galor, 2011; Kirk, 1996)

In the third stage of the demographic transition, the disequilibrium in the second stage due to declining mortality without a corresponding decline in fertility changes and the equilibrium is seemingly restored. In this stage of the transition, birth rates fall due to various fertility factors such as access to contraception. Other factors that may drive the fertility rates down include increases in wages, urbanization, a reduction in subsistence agriculture, an increase in the status and education of women, a reduction in the value of children's work, an increase in parental investment in the education of children and other social changes (Galor, 2011).
In the fourth and final stage of the demographic transition, there are both low birth rates and low death rates. Birth rates may drop to well below replacement level (being 2-3 children born by a woman) (Galor & Weil, 2000; Sachs, 2008)

3. Methodology

3.1 Data

The study employed panel data covering the period (1980 -2019). The data were obtained from the World Development indicators of the World Bank. The choice of the period of coverage in this study was subjective and solely decided by the data availability. The dependent variable is the Gross Domestic Product, the independent variables are demographic variables that determine economic growth, which include; fertility rate, life expectancy at birth, dependency ratio, urbanization rate, unemployment rate, young population (0-14 years); working population (16 – 64 years) and aging population (65 + years). The working age is also called economically active population (EAP).

3.2 Model and estimation techniques

The current paper aims at examining the impact of demographic changes on economic growth of SSA countries between 1980 and 2019. The model employed was adopted from Song (2013) with modifications. In Song's study, three multiple equations were specified. The first model captured the effects of workforce growth and total population growth, hence GDP per capita was regressed on growth rate of the total population, and growth rate of the working-age population. Following Bloom and Williamson (1998), the author inserted the growth rates of the young population and the elderly population to replace the growth rate of the total population. Thus, the second equation captured the effects of growth rates of all age groups on economic growth. The third estimatable model which followed Yu (2011) and Mody and Aiyar (2011), combined the growth rates of the total population and the working-age population into the growth rate of the ratio of the working-age population to the total population. The essence of the third specification was to further explore the effects of changes in age structure on economic growth. The control variables employed in the adopted model included: life expectancy (in years), domestic investment (as % GDP), openness, average years of secondary schooling (in years), proportion of land area within 100km of the ocean coastline (in %), proportion of land area within the geographic tropics (in %), and Quality of institution index (0-10). Both initial GDP per capita (as a ratio of US GDP), and initial ratio of working-age to total population were incorporated into each of the models.

Based on the peculiarity of the SSA countries and data availability, the adopted model was modified and specified as follows:

$$GDP_{i,t} = \beta_0 + \beta_1 GDP_{i,t-1} + \beta_2 FER_{i,t} + \beta_3 LEX_{i,t} + \beta_4 DEP_{i,t} + \beta_5 URB_{i,t} + \beta_6 UNP_{i,t} + \beta_7 YPOP_{i,t} + \beta_8 WPOP_{i,t} + \beta_9 APOP_{i,t} + \mu_{i,t} \quad (3.1)$$

Where, GDP is gross domestic product in local currencies (proxy for economic growth), FER is fertility rate, LEX denotes life expectancy at birth, DEP represents dependency ratio, URB is urbanization Rate, UNP denotes unemployment rate, YPOP stands for young population (0-14 years), WPOP connotes working population (15 -64Years), APOP is aging population (65 + years), $\beta_0 - \beta_9$ are the parameters to be estimated, μ is error term. The subscripts i and t denote country and time, respectively. The one period lagged endogenous variable ($GDP_{i,t-1}$) is introduced into the explanatory variables in order to test the effect of dynamic behavior and to control the convergence. The working population is incorporated as the economically active population, in order to estimate the impact of age-structural changes of population on economic performance of countries. All the modelled variables were log-transformed.

The specified model was estimated using the generalized method of moments (GMM) procedure as proposed by Arellano and Bond (1991), Blundel and Bond (1998). This approach appears superior to alternative panel data estimators (e.g., pooled ordinary least squares, fixed effect and difference GMM) as it could address the econometric problems caused by unobserved group-specific effects and endogeneity of the explanatory variables in lagged dependent variable models. Also, the system GMM estimator was proved consistent in parameter estimation and unbiased (Beck & Levine 2004; Baltagi, 2008; Hasan et al. 2009; Chu & Chu 2020). The consistency of the GMM estimator depends on the validity of the assumption that the error terms do not exhibit serial correlation and on the validity of the instruments. The validity of the instruments is tested using the standard Sargan tests of over- identifying restrictions.

Theoretically, it is expected that the coefficients of lagged endogenous variable (initial GDP), fertility rates, life expectancy, urbanization rate, the working and aging populations should be positive. In the case of the working-age population, people in that group are assumed to be more economically active in the sense that they work and save more than they consume (Higgins &Williamson, 1997; Bloom & Williamson, 1998). On the other hand, the coefficients of the young population, and dependency ratio are a priori expected to be negative. This group of the population are generally dependent and consume more than they produce and depends on the output and savings generated by the working-age population (Higgins &Williamson, 1997; Bloom & Williamson, 1998).

4. Results and Discussions

4.1. Empirical Results

The results of the System GMM presented in Table 4.1 show the one-step GMM result, the two-step GMM result, and the two-step with robust standard errors. The results of the post estimation tests associated with GMM analyses; which are the Sargan test of validity of instruments and the autocorrelation tests are also presented in the table.

Based on the result of the system GMM estimation for the effects of demographic changes on economic growth of SSA countries, the two step result is more efficient than the one step result as the Sargan test of validity of instruments suggests. As also noted by Blundell and Bond (1998) and Hasan et al. (2009) the two step procedure appears to be asymptotically more efficient. Based on the two step result summarized in Table 4.1, the lagged dependent variable (GDP_{t-1}) has a positive and statistically significant impact on economic growth of SSA countries. The positive coefficient of the lagged endogenous variable shows the dynamic behavior of the variable. Roodman (2009) suggests that if this coefficient is greater than 1, then System GMM is invalid. Here, it is 0.8470995 (< 1), so System GMM is valid. The coefficient of the lagged dependent variable being 0.8470995 suggests that the lagged values of the dependent variable accounts for about 84% increase in economic growth of SSA countries.

The coefficient of fertility rate (FER) being 0.3505709 suggests that a 1% increase in fertility rate of SSA countries will lead to a 35% increase in economic growth of SSA countries. The coefficient of life expectancy at birth (LEX) being -0.0646519 suggests that a 1% increase in life expectancy of SSA countries will lead to a 6% decrease in economic growth of SSA countries.

Table 4.1: Results of System GMM estimation

Variables	One step System GMM	Two step System GMM	Two step System GMM with robust standard errors
GDP_{t-1}	0.8455868***	0.8470995***	0.8470995
FER	0.3123928**	0.3505709	0.3505709
LEX	-0.1137239*	-0.0646519	-0.0646519
DEP	-0.3414785**	-0.1695829	-0.1695829

URB	0.6313975***	0.7002737**	0.7002737
UNP	-0.0794175***	-0.074488*	-0.074488
YPOP	-0.0464056	-0.2670561	-0.2670561
WPOP	-0.564467***	-0.4953549	-0.4953549
APOP	0.4593025***	0.4779138***	0.4779138
Sargan Test p-value	1496.271 (0.0000)	42.43162 (1.0000)	- -
AR (1) P value		-1.7169 (0.0860)	-0.75507 (0.4502)
AR(2) P-value		-0.62827 (0.5298)	-0.32672 (0.7439)
N	48	48	48
T	39	39	39

Source: Authors' computation using STATA 12, 2021.
***, ** and * indicate significance at 1%, 5% and 10% respectively.

The coefficient of dependency ratio (DEP) being -0.1695829 suggests that a 1% increase in dependency ratio of SSA countries will lead to a 16% decrease in economic growth of SSA countries. Urbanization rate (URB) has a positive and significant impact on growth. The coefficient of the variable being 0.7002737 suggests that a 1% increase in Urbanization rate of SSA countries will lead to a 70% increase in economic growth of SSA countries. Unemployment rate (UNP) has a significant impact on economic growth, the coefficient of the variable being -0.074488 suggests that a 1% increase in unemployment rate of SSA countries will lead to a 7% decrease in economic growth of SSA countries. The coefficient of young population (YPOP) being -0.2670561 suggests that a 1% increase in Young population will reduce economic growth by 26%. Similarly, the working population was found to have a negative impact on economic growth such that a 1% increase in working population will decrease economic growth by 49%. However, the aging population (APOP) has a significant positive impact on growth rate; the coefficient of the variable being 0.4779138 suggests that a 1% increase in aging population of SSA countries will lead to a 47% increase in economic growth of SSA countries.
The result of the validity of instruments (Sargan Test) being 42.43162 with a probability value of 1.0000 suggests that the instruments are valid. Similarly, the results of the autocorrelation tests AR (1) and AR (2) being -1.7169 (0.0860) and -0.62827 (0.5298) suggests that there is no autocorrelation among the residuals in the model.

4.2. Discussion of findings

The study found a positive but insignificant impact of fertility rate on economic growth of SSA countries. The signed coefficient conforms to a priori expectation, and contradicts Akintunde et al. (2013) which found that high fertility rate had a negative impact on economic growth in sub-Sahara Africa from 1970 to 2005. Life expectancy at birth was found to have a negative insignificant impact on economic growth of SSA, thereby violating the a priori expectation. However, the finding is consistent with the finding of Bloom et al. (2007) which found that low life expectancy has a negative impact on economic growth. Similarly, dependency ratio was found to have an expected negative impact, but coefficient is statistically insignificant. This finding conforms to the findings of Park and Shin (2011) and Porsse et al. (2012) which found that both old-age dependency and youth dependency had negative and significant impact on economic growth in their studies on Asia and Brazil respectfully.

Urbanization rate was found to have a positive and significant impact on economic growth of SSA countries, which is in line with the a priori expectation of this study. The study also found a significant negative impact of unemployment rate on economic growth of SSA. The result was as expected. The young and working population of SSA countries were found to have negative but insignificant impacts on economic growth. On the other hand, aging- population had a positive and significant impact on economic growth of SSA countries. The finding is however, not consistent with the finding of Kasnauskiene and Michenevic (2015), Bloom et al. (2010); Fu (2013); Hyung (2013) and Sundman (2011) which found negative linkages of the aging population on economic growth in their studies. However, Navaneetham (2002) found that the age grade 65 + has a differential impact on economic growth as it was found to have a negative impact in Singapore, but positive impact in Philippines. The positive impact of older population on economic growth implies a significant pressure on social security and medicare of the SSA countries. Government pension and healthcare funds will also be stressed, and this may likely compel governments to respond with some combination of increased borrowing, reduced benefits, increased taxes,

program restructuring, and policies intended to stem the growth rate of healthcare costs (Mester, 2017).

5. Conclusion and Recommendations

Unemployment and rural-urban migration are very prevalent in SSA countries. While urbanization can reduce the rural-urban drift and enhance economic growth, it can also bring employment opportunities to the rural areas and thus reduce the unemployment rates. Urbanization will bring health facilities, education and other social amenities to the rural areas, all of which interact with each other to enhance economic growth. Therefore, the role of urbanization as a demographic variable responsible for promoting rapid economic growth in SSA countries cannot be exaggerated.

On the basis of the main findings, the study recommendations that: i) The government of various SSA countries should strengthen national and economic institutions through pragmatic programmes and policies such as innovative industrialization and mass employment in the services sector based on Information and Communication Technology (ICT) to maximize the potential impact of its large and teeming population which is fast growing. ii) SSA countries should put urbanization at the heart of their socio-economic policies and programmes as it brings along economic opportunities and potentials to rural areas that will eventually serve as an impetus for rapid economic growth especially when these interact with demographic changes.

References

Ahmad, M., & Khan, R. E. A. (2018). Age-structure, human capital and economic growth in developing economies: A disaggregated analysis, *Pakistan Journal of Commerce and Social Sciences*, 12(1), 229-252.

Ahmed, S. A., Cruz, M., Go, D. S., Maliszewska, M., & Osorio-Rodarte, I. (2014). How significant is Africa's demographic dividend for its future growth and poverty reduction? Paper prepared for the Conference on Global Economic Analysis, June 18 – 20, Dakar.

Aiyar, S. & Mody, A. (2011). The Demographic Dividend: Evidence from the Indian States. Indian Policy Forum, 2012-2013, 105 -148.

Akintunde, T. S., Olomola, P. A., & Oladeji, S. I. (2013). Population dynamics and economic growth in sub-Sahara Africa. Journal of Economics and Sustainable Development, 4(13), 148-157.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58 (2), 277-300.

Baltagi, B. H. (2008), Econometric Analysis of Panel Data: Econometric theory. 4th edition, John Wiley & Sons.

Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. *Journal of Banking and Finance*, 28, 423–42.

Bloom, D. E., Canning, D., Fink, G., & Finlay, J. E. (2007). Does age structure forecast economic growth? National Bureau of Economic Research (NBER) Working Paper No. 13221.

Bloom, D. E., Canning, D. & Finlay, J. E. (2010). Population aging and economic growth in Asia. *National Bureau of Economic Research (NBER-EASE)* 19(1), 61-89.

Bloom, D. E., Canning, D., & Rosenborg, L. (2011). Demographic change and economic growth in South Asia. Programme of the Global Demography of Aging (PGDA) working paper no. 67.

Bloom, D. E., Canning, D., & Malaney, P. N. (1999). Demographic change and economic growth in Asia. Center for International Development at Harvard University Working Paper No. 15.

Bloom, D. E., Canning, D., & Malaney, P. N. (2000). Population dynamics and economic growth in Asia. *Population and Development Review*, 26(1), 257 -290.

Bloom, D. E., Humair, S., Rosenborg, L., Sevilla, J. P., & Trusell, J. (2013). A demographic dividend for sub-Sahara Africa: Source, magnitude and realization. Programme on the Global Demography of Aging PGSA Working Paper No.110.

Bloom, D. E., Canning, D., & Sevilla, J. (2001). Economic growth and the demographic transition. National Bureau of Economic Research (NBER) working paper No. 8685

Bloom, D. E., & Williamson, J. G. (1998). Demographic transitions and economic miracles in Emerging Asia. *World Bank Economic Review*, 12(3), 419-455.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87, 115- 143.

Caldwell, J. C., Bruce K. C., Caldwell P., Peter, F. M., & Thomas, S. (2006). *Demographic transition theory*. Dordrecht, the Netherlands: Springer.

Choudhry, M. T. and Elhorst, J. P. (2010). Demographic transition and economic growth in China,

Chu, L. K., & Chu, H. V. (2020). Is too much liquidity harmful to economic growth? *The Quarterly Review of Economics and Finance*, 76, 230–42.

Fu, J. (2013). The impact of population aging on economy: Evidence from China and Japan. Doctoral Dissertation (Graduate School of Economics and Management, Tohuku University, Japan).

Galor, O., & Weil, D. N. (2000). Population, technology and growth: From Malthusian stagnation to the demographic transition and beyond. *American Economic Review*, 90(4), 806-828.

Galor, O. (2011). Unified growth theory. *Journal of Economic Literature*, forthcoming. *www.wikipedia.com*.

Gene, S., Wang, X. & Liu, Y. (2017). Brief review of world population trends. http://gsociology.icaap.org/report/demsum.html.

Golley, J., & Tyers, R. (2013). Contrasting giants: Demographic change and economic performance in China and India. *Procedia-Social and Behavioural Sciences, 77(1), 353 -383*.

Hasan, I., Wachtel, P., & Zhou, M. (2009). Institutional development, financial deepening and economic growth: Evidence from China. *Journal of Banking & Finance*, 33, 157–70

Hassan, I. B., Akpansung, A. O.; & Amade, P. (2020). Age structures and economic growth of African countries: An empirical analysis. *Dutse Journal of Economics and Development Studies*, 8, 161-172.

Higgins, M., & Williamson, J. G. (1997). Age structure dynamics in Asia and dependence on foreign capital. *Population and Development Review*, 23(2), 261-293.

Hyung, J. (2013). Analysis on the effect of old age dependency ratio on domestic saving rate. University of California, Berkeley Department of Economics.

Hu, Q., Lei, X., & Zhao, B. (2020). Demographic changes and economic growth: Impact and mechanisms. *China Economic Journal*, 2 (1), 1-27.

Joe, W., Dash, A. K., & Agrawal, P. (2015). Demographic transition, savings and economic growth in China and India. IEG working paper No. 351.

Kasnauskiene, G., & Michenevic, K. (2015). The effects of demographic trends on economic growth in the European Union. *European Scientific Journal*, 2(1), 69 -85.

Khan, M. Z., Ellahi, N., Sheikh, M. R., & Sheikh, S. M. (2016). Changing demographics and economic growth: A study of Pakistan. *International Journal of Management Research and Emerging Science*, 6(1), 59 - 75.

Kirk, D. (1996). Demographic transition theory. *Population Studies*, 50(3), 361-387.

Lam, D., Leibbrandt, M., & Allen, J. (2019). The Demography of the Labor Force in Sub-Saharan Africa: Challenges and Opportunities. GLM|LIC Synthesis Paper No. 10.

Le, D. T. & Park, H. (2020. The impact of demographic change on economic growth. *The Singapore Economic Review*, 65(02) 471-484.

Liu, S., & Hu, A. (2013). Demographic change and economic growth: Theory and evidence from China. *Economic Modelling*, 35, 71-77.

Mody, A., & Aiyar, S. (2011). The Demographic Dividend: Evidence from the Indian States. IMF Working Paper, WP/11/38.

Munir, K., & Shahid, F. S. U. (2021). Role of demographic factors in economic growth of South Asian Countries. *Journal of Economic Studies*, 48(3), 557- 570.

Navaneetham, K. (2002). Age structural transition and economic growth: Evidence from South and South East Asia. Asian Meta Center Research paper series No. 7

Ogundari, K. and Awokuse T. (2018). Human capital contribution to economic growth in sub-Saharan Africa: does health status matter more than education? Economic Analysis and Policy, 58, 131-140.

O'Neil, A. (2021). Total population in Sub-Saharan Africa 2020. July 28. https://www.statista.com/statistics/805605/total-population-sub-saharan-africa/.

Park, D. & Shin, K. (2011). Impact of population aging on Asia's future growth. Asian Development Bank working paper series no. 281.

Porsse, A. A., Stampe, M. Z., Portugal, M. S., & Almeida, E. S. (2012). Demographic change and regional economic growth in Brazil. The University of Sao Paulo Regional and Urban Economics Lab. TD Nereus 03-2012.

Prskawetz, A., & Lindh, T. (Eds.)(2007). The relationship between demographic change

and economic growth in the EU. Research Report 32.

Roodman, D. (2009). A note on the theme of too many instruments, Oxford Bulletin of Economics of Statistics, 71(1), 135-158.

Sachs, J. (2008). The end of poverty: How we can make it happen in our lifetime. New York: Penguin Books.

Schoch, M., & Lakner, C. (2020). The number of poor people continues to rise in sub-Saharan Africa despite slow decline in the poverty rate. World Bank Blogs. https://blogsworldbank.org.

Song, S. (2013). Demographic changes and economic growth: Empirical evidence from Asia. Illinois Wesleyan University. Digital Commons @IWU. Honours Project. Paper 121.

Sundman, M. (2011). The effects of the demographic transition on economic growth: Implications for Japan. Jonkoping International Business School. Bachelor's thesis within Economics.

Tibutin, D. (2004). The Demography of Sub-Sahara Africa from the 1950s to the 2000s: A Survey of Changes and a Statistical Assessment. *Population*, 59(1), 455 -555.

The Economist (2020). Africa's population will double by 2050. Special report. Mar 28th edition. https://www.economist.com/special-report/2020/03/26/africas-population-will-double-by-2050.

Thompson, W. S. (1929). Population. *American Journal of Sociology*, 34(1), 959 -975.

Tobing, E. (2012). Demography and cross country differences in savings rates: A new approach and evidence. *Journal of Population Economics, 25(3), 963 – 987.*

United Nations (2015). Population facts paper no. 2015/1 (www.unpopulation.org).

Ven, R. V. D., & Smits, J. (2011). The demographic window of opportunity: Age structure and sub-national economic growth in developing countries. *Nijmegan Center for Economics (NiCE) Working Paper 11-102.*

Woods, R. (2000). The Demography of Victorian England and Wales. Cambridge University Press.

Yoon, J., Kim, J., & Lee, J. (2014). Impact of Demographic Change on Inflation and the Macroeconomic. IMF Working Paper No: WP/14/210.

Yu, Z. (2011). Demographic Dynamics and Economic Take-Off: Economic Impact of China's Population-Control Policies. *Chinese Economy*, 44(1), 72-90.