

# DIGITALES ARCHIV

ZBW – Leibniz-Informationszentrum Wirtschaft  
ZBW – Leibniz Information Centre for Economics

Peter, Sede Igbaudumhe; Adediyan, Aderopo Raphael

## Article

# Monetary policy and life expectancy in Sub-Saharan Africa

## Provided in Cooperation with:

Dimitrie Cantemir Christian University, Bucharest

*Reference:* Peter, Sede Igbaudumhe/Adediyan, Aderopo Raphael (2019). Monetary policy and life expectancy in Sub-Saharan Africa. In: Academic journal of economic studies 6 (1), S. 61 - 69.

[http://www.ajes.ro/wp-content/uploads/AJES\\_article\\_1\\_314.pdf](http://www.ajes.ro/wp-content/uploads/AJES_article_1_314.pdf).

This Version is available at:

<http://hdl.handle.net/11159/4666>

## Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics  
Düsternbrooker Weg 120  
24105 Kiel (Germany)  
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)  
<https://www.zbw.eu/econis-archiv/>

## Standard-Nutzungsbedingungen:

Dieses Dokument darf zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden. Sie dürfen dieses Dokument nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, aufführen, vertreiben oder anderweitig nutzen. Sofern für das Dokument eine Open-Content-Lizenz verwendet wurde, so gelten abweichend von diesen Nutzungsbedingungen die in der Lizenz gewährten Nutzungsrechte.

<https://zbw.eu/econis-archiv/termsfuse>

## Terms of use:

*This document may be saved and copied for your personal and scholarly purposes. You are not to copy it for public or commercial purposes, to exhibit the document in public, to perform, distribute or otherwise use the document in public. If the document is made available under a Creative Commons Licence you may exercise further usage rights as specified in the licence.*

# Monetary Policy and Life Expectancy in Sub-Saharan Africa

Sede Igbaudumhe Peter<sup>1</sup>, Aderopo Raphael Adediyen<sup>2</sup>

<sup>1,2</sup>Department of Economics, Faculty of Social Sciences, University of Benin, Benin City, Edo State

<sup>1</sup>E-mails: [P.petersede@gmail.com](mailto:P.petersede@gmail.com); [peter.sede@uniben.edu](mailto:peter.sede@uniben.edu), <sup>2</sup>E-mail: [adediyen@yahoo.com](mailto:adediyen@yahoo.com)

---

## Abstract

Monetary policy could be seen as a policy motivation for the attainment of economic development, through its production facilitating mechanism. One of the crucial indices of economic development is life expectancy which is a direct outcome of the standard of living. The relatively low life expectancy in sub-Saharan Africa continued to receive attention in economic literature owing to its devastating effect on the affected economies. In this paper, the effect of monetary policy on life expectancy, in the region, is examined. The study covers 37 countries in sub-Saharan Africa between 2004 and 2017. The paper uses panel co-integration and System GMM model in its estimation. The result establishes that, although an expansionary monetary policy is relevant in controlling life expectancy, its level of impact is not strong; monetary policy is less effective. Fiscal policy, environmental quality (CO<sub>2</sub>) and standard of living, on the other hand, are found to be more effective in the determination of the life expectancy with environmental quality appearing as a dominant factor. The study, therefore, recommends, among others, that monetary policy should be made relevant to economic transactions on goods and services that bother on health outcomes.

## Keywords

Environmental quality, life expectancy, living standard, monetary policy

**JEL Codes:** E52, I10, O10

© 2020 Published by Dimitrie Cantemir Christian University/Universitara Publishing House.

(This is an open access article under the CC BY-NC license <http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Received: 30 December 2019

Revised: 18 January 2020

Accepted: 27 January 2020

---

## 1. Introduction

In the realm of macroeconomics, two fundamental tools at the disposal of the government to alter the living condition of the people or to manipulate and control the economy, either in part or whole, are the fiscal and the monetary policies. For the purpose of comparison, the argument is still raging as to which of these policy instruments is the most effective to achieve desired macroeconomic objectives or to combat a given socio-economic ailment. However, this shall not be addressed here; we rather consider these economic policy instruments as complementary with much emphasis on how well one of it particularly the monetary policy may be used to improve the quality of life in sub-Saharan Africa. No doubt, monetary policy which is formulated, implemented and managed by the monetary authority affects people's lives either by altering the pattern of households' consumption or firms' investment expenditure that both defined the quality of human life.

While the 20<sup>th</sup> century development economists explained economic development in terms of the social and economic well-being of the people, of more importance is the modern development economists' perception of the quality of life of the people as the basic indicator of economic development of which life expectancy plays a significant role. In recent time, the issue of life expectancy is envisaged as one among the several pertinent of health outcomes that determines the quality of human life (IMF, 2004). For optimal benefits of high quality of human life, many sub-Saharan Africa policymakers frequently sought for ways to lengthen the life expectancy of its population vis-à-vis a mortality rate reduction policy design among others. However, the reverse is often the case; manifestation of low life expectancy is still evident in most of the regions.

Based on the United Nations classification in 2008, the issue of low life expectancy is predominantly recorded high in the low-income economies compared to the high-income economies. According to the classification, the gap in life expectancy between the low and high-income economies is up to 11 years. Consequently, low life expectancy appears to be a particular instance of developing or low-income economies. Low life expectancy has serious socioeconomic implications, not only for the individual member of a given country but also for the country as a whole. The empirical evidence of the study of Cervellati and Sunde (2009) showed that low life expectancy is extremely related to poor per capita income growth (low living standard of the economic agents).

On the contrary, higher life expectancy drives up the population, increases the labour force and output of the economy (Acemoglu and Johnson, 2007). Thus, government at all levels and in every region especially those with the worse scenario of life expectancy tend to put more than a few policies that may elongate human lives at the forefront in their daily policy decision-making processes. For instance, Sede and Ohemeng (2015) stressed that one of the health policy targets of the

Nigerian government is to raise life expectancy in Nigeria to at least 70 years come the year 2020. Such health policy target is not peculiar to Nigeria alone many low-income economies also adopted a similar target to reduce the prevalence of low life expectancy in the economy.

In this spirit, Sufian (2013) opined that decreasing nation's mortality rate to a bare minimum level is among the planned policies introduced by the government across lots of countries to combat the low life expectancy in those countries. In sub-Saharan Africa, several health reforms were embarked on to improve life expectancy in the region. These include the introduction of the user fees, decentralization and community financing strategies (Gilsona and Mills, 1995). In addition, governments of this region made deliberate policy effort towards improving the health of the populace through the Abuja declaration 2001. The declaration stipulated that, at least, 15% of annual budgets of African economies be dedicated to the health sector of the economies. To boost this effort, the concept of Health Insurance was reawakened to reduce avoidable mortality through forestallment against health risks. Alongside these health policy considerations, in the guise of structural adjustment, the economies within the region had embarked on the use of monetary policy tools such as exchange and interest rates, to list but two, to address fundamental economic challenges in the economy. The policy targets of such monetary controls were mainly the enhancement of sustainable growth, low inflation and external balance in the region. The expectation is that if these targets are achieved, economic development becomes the ultimate result. The paradox is that, all through these policy regimes, life expectancy, an important index of economic development, is not showing evidence of improvement. The pertinent question here is; what happened to the health sectors of these economies as per their monetary policies? Is it that the monetary policies are biased in favour of the financial and external sectors only, too little or no particular attention to the health sector of these economies?

Life expectancy in the region is so low relative to other economies of the world. In 2015 for instance, while high-income economies such as Japan, Hong Kong, Singapore, and Italy have life expectancy of about 83.74, 82.07, 82.66 and 83.31 years respectively, far above the World average life expectancy of approximately 71.86 years, sub-Sahara African economies like Cote d'Ivoire, Lesotho, Chad and Nigeria respectively, have average life expectancy of about 50.97, 49.50, 51.13 and 52.29 years in the same period (CIA, 2017). The similar trend continues in 2016 and 2017. In other words, sub-Saharan Africa (SSA) economy experiences low life expectancy at birth when likened to high-income economies, taking the world average life expectancy (71.86 years) as a benchmark. The economic implication of the above level of disparity in life expectancy may be that the SSA is predisposed to high mortality rate, and perhaps, poor quality of life compared to the advanced economies. Hence, we ask, how can it be corrected?

In this regard, there must be a shift of emphasis from the manipulation of traditionally preconceived socio-economic factors determining the current trend in life expectancy in SSA to a search for an effective economic policy to adequately combat same. It is against this backdrop, that, this paper is developed to explore the relevance of monetary policy, as an economic tool, in addressing the problem of low life expectancy in SSA. Base on the foregoing the following questions bother this paper:

- i. How significant is monetary policy in determining life expectancy in the sub-Saharan region of Africa?
- ii. What is the magnitude of the impact of the monetary policy on life expectancy in SSA?
- iii. Can the SSA governments complement monetary policy with fiscal policy to improve life expectancy in the region?

The broad objective of this paper is to determine the extent to which monetary policy may be used to improve life expectancy in SSA.

While most of the earlier studies considered biological, social and physical factors as determinants of life expectancy in SSA, this research deviates extensively from such by examining the role of economic policy, particularly, the monetary policy in combating low life expectancy in SSA. It is believed that the outcome of this research will produce a clear insight into the link between monetary policy and low life expectancy, and the extent to which the former may be used to address them later.

## 2. Literature Review

Among the available designed options to influence the quantity of money and credits available in the economy to control economic activities and raise the level of the living condition of people is the monetary policy (Okpara, 2010). Monetary policy, in addition to its impact on the cost of capital acquisition and financing capability of the economy, is believed to have an effect on the ability of banks or financial sector to create credit in the system. Monetary policy alters the future expectations of the economic agents; it dictates the pattern and dimension of households' consumption and firms'

engagement in investment spending in accordance with the preconceived plan of the monetary policymakers (Adekunle *et al.*, 2018).

Monetary policy may take different policy dimensions: it could be expansionary or restricted monetary policy (Ghingan, 2013), each of which has a direct or indirect consequence on the length of lifespan of individual economic agents. In a restricted monetary policy regime, the cost of borrowing to finance consumption and investment increased as the volume of money supply in circulation reduces (Adeoye and Shobande, 2017). This may be linked to the level of life expectancy of the people through different ways or channels: if the money supply is restricted, households' demand for healthcare service will be negatively affected owing to low consumption of consumer goods or medical care services emanating from increased real rate of interest that limits the amount of loanable fund that could be borrowed. Because of the low demand for healthcare service, people are vulnerable to short-term lifespan (Rahman *et al.*, 2018). The situation worsens if the households lack access to self-provided life-saving health facilities.

In the case of a firm, investment spending is reduced owing to a high real rate of interest (Ghingan, 2013); hence, a reduced income to employees and the concerns. A reduced income discourages the firm's acquisition of capital goods required for future production. Also, a reduced or low level of income propagates low life expectancy (Bowser, 2010). Health goods may also be classified as a special type of capital (Mahyar, 2016); as a result, a restricted monetary policy has an impact on health outcome as it raises the cost of capital and lowers the demand for health goods, and subsequently, dampens the level of human life expectancy rate. The above scenarios are reversible under the regime of expansionary monetary policy.

Because of the possible different routes of transmission of the impulse of monetary policy to the desired economic variables, such as health, the rightful channel of transmission through which monetary policy affects individual lives and the economy as a whole has been the source of the current debate in the literature (Adeoye and Shobande, 2017). Bitrus (2014) outlined five channels: the credit (banks' lending), interest rate, asset price, exchange rate, and inflation expectations channels, through which the monetary policy flows in the economy to effect changes in the composition of the nature of resource allocation or distribution and the pattern of consumption, and in general, aggregate output in the economy. The interest rate channel of the transmission mechanism of the monetary policy follows the Keynesian approach.

In the Keynesian transmission channel model, expansionary monetary policy in the form of raise in the money supply crashes real interest rate; fall in the real cost of borrowing enables individual households to increase consumption which may be financed by borrowing; firms also demand more of investment expenditure. The overall impact is the increase in investment, employment and income (Ghingan, 2013). With the growth in the level of income, households increase demand for health sector services which may help to reduce mortality rate, the level of susceptibility to diseases, and consequently, improvement in the quality of health outcome (Grossman, 1972; Timothy, 2018; African Development Bank, 2016). Accordingly, while identifying the important role of the interest rate in the monetary policy transmission channel, the research conducted by the European Central Bank in 2002 suggests that the indirect and direct impacts of changes in interest rate which incorporate both exchange rate and wealth effects on investment account for roughly 80 per cent of the overall response of aggregate output to stocks in monetary policy.

Contrary to the envisaged smooth transmission of the monetary policy impulse to the real sector vis-à-vis the channel of interest rate, Bitrus (2014), contended that the extent of competition among banks in the banking system goes a long way to determine the effectiveness of the interest rate channel. An alternative to the interest rate channel is the credit channel. The credit channel mechanism has to do with the banks' lending. This medium utilizes the financial system of the economy to effect changes in the level of economic activities. The bank lending channel affects investment, employment and output via changes in the supply of bank loans in the economy. In the banks' lending channel, a tightened monetary policy by the apex bank reduces the number of loanable funds available to business through banks. This, in turn, reduces the level of economic activities in the country. According to Adeoye and Shobande (2017), bank as a source of capital for the private businesses or sector is a crucial condition for the credit transmission channel to work particularly in the economy that is bank-based.

Therefore, this channel of transmission mechanism depends heavily on the assumption that there is little or no operation of the informal sector in the economy up to the point of hindering the implementation of the monetary policy as neatly formulated by the monetary authority. According to Bitru (2014), one important stumbling block to the proper functioning of the monetary policy especially in terms of credit control management channel is the existence of the informal sector or parallel market that counter the effect of the policy. For instance, if the monetary authority decided to pursue a tightened monetary policy, the businesses or economic agents will simply resort to the informal sector or parallel market to obtain the

desired or needed amount of loanable funds. Subsequently, the potency of the monetary policy in the management or control of the economic output is questionable.

The exchange rate channel, the third channels of the transmission mechanism, works vis-à-vis changes in the rate of exchange. Bitrus (2014) argued that changes in the rate of exchange have consequences on the spending attitude of households and the firms that in turn influences the demand for goods and/or services. For example, in a flexible exchange rate system, there will be depreciation of local currencies if an expansionary monetary policy is employed. This, in turn, will heighten the prices of goods imported. It is to be noted that in most of the sub-Saharan Africa countries, virtually all the health inputs or healthcare facilities are imported; hence, increase in the prices of imported health products will make the consumers reduce the level of the demand for those health goods thereby increasing the risk of facing low life expectancy in the region. In the asset channel of the monetary policy transmission mechanism, three sub-channels of transmission mechanism are identified: the wealth effect channel and changes in the level of credits via the financial intermediaries' balance sheet as well as the Tobin's Q effect channel (Adekunle *et al.*, 2018; Bitrus, 2014). The asset price medium of transmission mechanism affect prices much in the equities market; accordingly, the movement in those asset prices could cause wealth effects via expenditure on output as well as employment (Bitrus, 2014: 57).

### 3. Empirical Literature

There is scarce empirical evidence on the relationship between the effectiveness of monetary policy and the level of life expectancy of people in the literature; however, Lin *et al.* (2012) investigated the social and political determinants of life expectancy in the less developed countries. The study considered 119 less developed countries over a period of 35 years. The longitudinal effects of the social and political factors incorporated in the model were analyzed on life expectancy by adopting the method of the linear mixed model. The study finds that the political regime has a small impact on life expectancy in the region. The study concludes that despite the fact that the smallness of the impact of the political factor on rising life expectancy in the short-term when likened to the impact of the other factors in the model, the long run effect of political factor should not be underrated.

Monsef and Mehrjardi (2015) using the panel data examined the economic, environmental and socio factors that determined life expectancy over the between 2002 and 2010 in 136 countries. Findings of their study revealed that while inflation and unemployment remain the major economic factors influencing life expectancy negatively, the national income (gross) and the gross capital formation have positive effects on life expectancy. Furthermore, the rate of urbanity appears as the dominant socio-environmental factor responsible for the mortality rate. Leung and Wang (2003) worked on the link between the life expectancy, healthcare and output by applying the augmented neoclassical model of growth. The study's empirical result suggests that economic development factors exhibit a positive effect on human life.

Shin (2013) empirically investigates the effect of the pension system on the lifetime utility level as well as the life expectancy. The outcome of the research showed that with the pension system life expectancy can be made longer or shorter, although it is not often the case that, lifetime utility level can be improved by the pension system. Timothy (2018) studied economic globalization as a determinant of life expectancy in Nigeria between 1986 and 2016. The study indicated that, in Nigeria, there is a positive and statistically significant effect of economic globalization on life expectancy.

In Pakistan, Ali and Audi (2016) assessed globalization as a determinant of life expectancy between 1980 and 2015. The study employs the Autoregressive Distributed Lag (ADL) model as the principal estimation technique. The study finds a significant positive relationship between life expectancy and globalization in Pakistan. From the foregoing, it can be seen that there is a dearth of literature on monetary policy and life expectancy in sub-Saharan Africa. It is his gap this paper wishes to fill.

### 3. Theoretical Framework

The theoretical framework of this study is based on Grossman (1972) health demand function. According to him, the demand for health is derived demand. Here it is imagined that individuals demand health care because they want to be healthy. Thus health care demand is determined by direct health-improving variables such as medicine consumed, healthy habits such as exercise, good feeding, good sexual habits to name but three, possession of other health-enhancing goods and services as well as factors of production with which health facilities can be produced. Hence quantitatively the Grossman health demand function is stated as:

$$H_t = H(H, X, Z) \quad (1a)$$

$H_t$  is the current health stock of the individual, "H" is health-improving variables consumed by the individual, X is other health-enhancing goods and services and Z is factors of production with which health facilities can be produced.

For easy policy leverage, this study intends to pick on  $X$  as a major variable that supports health. This is also in tandem with Popoola (2018) who also expresses health as a function of  $X$ . That is:

$$H = f(X) \tag{1b}$$

According to Popoola (2018),  $X$  represents the vector of the several factors upon which the health stock of the populace depends. Following Grossman (1972), however,  $X$  depends on the individuals' income and initial endowment. That is:

$$X = X(Y, E_0) \tag{2}$$

Where  $Y$  = Income and  $E_0$  = initial endowment. Given that real income, on its part, depends on the cost of living which essentially depends on price level, government fiscal policy and exchange rate of the domestic currency (Keynes, 1936), and that price level is directly related to the money supply (Fisher, 1930).

$$Y = Y(\text{EXR}, \text{INF}, M^s, \text{GEXP}) \tag{3}$$

Substituting for  $Y$  in equation 2 will yield:

$$X = X(\text{EXR}, \text{INF}, M^s, \text{GEXP}, E_0) \tag{4}$$

Equation 4 can be substituted into equation 1 to yield:

$$H_t = H(\text{INF}, M^s, \text{EXR}, \text{GEXP}, E_0, Z) \tag{5}$$

Equation (5) essentially expresses health as a function of monetary policy and therefore, states that current health stock depends on the inflation rate, money supply, exchange rate, government fiscal policy (captured by government expenditure).

### 3.1. The Empirical Model, Method and Data

Following Grossman (1972) and Popoola (2018) the empirical model for the study is specified as follows:

$$LXC_{it} = fH(\text{GHX}_{it}, \text{EQ}_{it}, \text{LS}_{it}, M^s_{it}) \tag{6}$$

Where  $LXC$  is life expectancy,  $M^s$  is money supply (used as a proxy for monetary policy. An alternative to this is the monetary policy rate (interest rate), this is not included in the model along with the money supply since change in money supply to effect change in the desired macroeconomic variables works through changes in the interest rate),  $\text{GHX}$  is the government health expenditure used to capture the fiscal policy. The  $\text{EQ}$  stands for the quality of the environment. It is meant to measure the impact of the environmental quality on life expectancy. To measure this,  $\text{CO}_2$  emission per capita is adopted. Ominyi and Abu (2017) used this indicator to measure environmental quality.  $\text{LS}$  denotes standard of living of the populace and this was proxy in the study with real GDP per capita. Lastly, " $i$ " is the  $i$ th countries at the time " $t$ " in the sub-region. In an estimable and dynamic format, equation (6) is re-specified as:

$$LXC_{it} = \gamma LXC_{it-1} + \beta Z_{it} + \Omega_{it} + \Phi_{it} + V_{it} \tag{7}$$

Where  $LXC_{it-1}$  is the predetermined variable (lagged value of the dependent variable),  $Z$  is a vector of exogenous explanatory variables in the model, and  $t$  and  $i$  are for time periods and units of analysis respectively, while  $\Omega_i$  is a vector of country-specific effects,  $\Phi_i$  stands for the vector of time period effects, and lastly,  $V_{it}$  denotes the error term.

Application of first difference transformation to Equation (7) yields:

$$(LXC_{it} - LXC_{it-1}) = \omega (LXC_{it-1} - LXC_{it-2}) + \pi_i (Z_{it} - Z_{it-1}) + (V_{it} - V_{it-1}) \tag{8}$$

Equation (8) represents the first differenced model; this is believed to correct the problem created by including the lagged value of the dependent variable as one of the explanatory variables. Differencing of equation (7) purges out the country-specific effect in the model.

### 3.2. Method of Estimation

The method of estimation adopted is the System GMM. This method combines the regression in level specified as equation (7) with that indifference denoted as equation 8 above (Arellano and Bover, 1995; Blundell and Bond 1998). This approach expresses one of the equations in its level form along with the first difference as the instruments, but the second equation is expressed in its first difference form coupled with levels as the instrument. System GMM corrects, among others, the endogeneity bias emanating from including the lagged dependent variable ( $LXC_{it-1}$ ) which correlates with the error term, even though we may presumed disturbances term to not be autocorrelated with others. System GMM produces more robust and efficient results compared to Panel OLS, Fixed Effect Model, Random Effect Model and Difference GMM

(Akanni, 2007). In addition to the System, GMM adopted, a multidimensional approach to panel co-integration test is employed.

### 3.3. Data Source and Sample Size for the Study

The data for the study were collected from the World Bank database and CIA World Fact Book. The data sourced spanned between 2005 and 2018. The study covers 35 sub-Saharan Africa Countries.

## 4. Empirical Results and Analyses

### 4.1. The Descriptive Statistic of Variables

Table 1. The Summary of Descriptive Statistic

Variables	Mean	Standard deviation	Min. Val.	Max. Val.
Standard of Living	2.254515	4.977094	-36.8299	32.24777
Life Expectancy	54.15074	15.84765	0.0000	74.30975
CO <sub>2</sub> per capita	1.327171	3.823674	0.0000	32.64384
Government Health expenditure	72.74605	135.1534	0.0000	871.9224
Monetary Policy	15.06287	15.5693	-54.68515	104.5661

**Source:** Computed by the Authors

Table 1 presents a brief description of the variables used in the analysis of the relationship between monetary policy and life expectancy along with the other relevant variables in the study region. From the Table, monetary policy, proxy by broad money supply, has ranged from a minimum of 0.00 to a maximum value of about 104.57 with a mean value of about 15.06 and standard deviation value of approximately 15.57 over the sample period. CO<sub>2</sub> per capita (a measure of environmental quality) has the lowest mean and standard deviation values of about 1.34 and 3.82 followed by the standard of living with a mean and standard value of about 2.25 and 4.98 respectively. Government health expenditure has the largest mean and standard deviation values of about roughly 72.75 and 135.15 over the study period.

### 4.2. Empirical Results

The empirical results of our study revealed that the monetary policy has a significant positive relationship with the level of life expectancy of people in sub-Saharan Africa. From the table of the result reported below, it is noticeable that the magnitude of the impact of the monetary policy on life expectancy is weak, about 0.06; consequently, change in the monetary policy will sluggishly but positively impacts the rate of life expectancy in sub-Saharan Africa. This is not amazing following the multi-channels or several processes that the policy has to pass through to impact changes on the desired economic target(s). Also, the one-period lagged value of life expectancy is found to be positively related to its current value and statistically significant. The two periods lagged value of the life expectancy has no empirical impact on the current value. Additionally, the immediate value of the government health expenditure, in line with the theoretical postulation, showed a positive relationship with the life expectancy indicator. This authenticates the study of Rahman, Khanam and Rahman (2018) that government health expenditure positively determines the life expectancy rate. With the associated p-value of 0.000, government health is statistically relevant in the determination of the length of life of the people in sub-Saharan Africa. On the other hand, a year lagged value of the government health expenditure turned out to be negative. But there is a lack of statistical evidence that inverse relationship exists between the government health expenditure and life holds at 5 per cent level of significance.

Although the degree of the impact of government health expenditure on life expectancy outweighs the impact level of the monetary policy, this does not imply substitutability, rather a “complementarity” of role between them as suggested by the coefficient of the interaction between monetary policy and the fiscal policy (government health expenditure) which was found to be statistically significant. In other words, fiscal policy is found to reinforce monetary policy to impact positively on the life expectancy of people in SSA.

Table 2. System GMM Regression Results

Variables	Coefficients
Life expectancy (LXC(-1))	1.519483* [0.008]
Life expectancy (LXC(-2))	0.521424 [0.228]

Variables	Coefficients
Monetary Policy (MP)	0.00589381* [0.006]
Government Health Expenditure (GHX)	0.981855* [0.000]
Government Health Expenditure (GHX(-1))	-0.008969 [0.113]
Monetary Policy × Govt. Health Exp. (MP*GHX)	1.002578* [0.009]
CO <sub>2</sub> per capita (Environmental Quality)	-1.74334* [0.000]
CO <sub>2</sub> per Capita (Environmental Quality) (-1)	1.746277* [0.001]
Standard of Living	0.2718297* [0.002]
Sargan Chi. 31.67206 [0.8235]	
AR(1)	-1.43 [0.151]
AR(2)	1.21 [0.225]
No. of Instrument: 58	
No. of Observations: 440	

\*\* means significant at 5%; values in the parentheses are the probability values of each of the estimates.

**Source:** Authors' computation

The result further suggests that the current value of CO<sub>2</sub> emission per capita used as a proxy for environmental quality negatively impact on the life expectancy in SSA. The coefficient obtained for the CO<sub>2</sub> emission per capita as showed in the Table above is large; thus, the rate at which the life of the populace shortens owing to the growth in the level of emission of CO<sub>2</sub> is rapid. Contrarily, the immediate lagged value of the CO<sub>2</sub> is positively and related to the life expectancy rate. One justification for this may hinge on the fact that growth in the CO<sub>2</sub> in the previous year implies an increase in the industrial production activities that may have positively impacted the lives of the people. When industries increase production, they employ more agents, increase income flows in the society; the people or agents live longer owing to the availability of income to take care of their needs such as investing in healthcare service and to engage in any life-saving activities. Subsequently, a positive relationship may be expected under such circumstance or situation.

More so, the living standard of the masses turned out with the right sign as expected theoretically. It is found to be positive and statistically significant at 5 per cent. This implies that the standard of living positively determine how long people live in sub-Saharan Africa. In other words, the human life expectancy rate in sub-Saharan Africa is positively related to the living standard of people in the region. A percentage increase in the living condition of the people creates about 0.27 increases in life expectancy of the region.

#### 4.3. Panel Co-integration Results

Table 3. The Pedroni Co-Integration Test Outcome

Within-dimension	Stat.	Prob
Panel v-Statistic	15.57804	0.0000
Panel rho-Statistic	-2.498001	0.0062
Panel PP-Statistic	-16.64382	0.0000
Panel ADF-Statistic	-3.601629	0.0002
Between-dimension		
Group rho-Statistic	0.390693	0.6520
Group PP-Statistic	-18.71539	0.0000
Group ADF-Statistic	-2.980283	0.0014

Table 4. Kao Co-integration Result

ADF	Statistic	Prob
	-3.124280	0.0009

**Source:** Author's computation

In Table 3 and 4 above, we present the Pedroni panel and Kao, respectively, co-integration test reports. From the Table, we reject the null hypothesis of no co-integration with the conclusion that there is a long run relationship among the variables used for the study.

## 5. Conclusions and Recommendations

The basic findings of this study are highlighted below:

- Monetary policy, although positively related, has no strong impact on the rate of life expectancy in sub-Saharan Africa; hence, the effectiveness of monetary policy in combating the challenge of low life expectancy rate in sub-Saharan Africa is minimal. In other words, if the government of SSA resulted to the manipulation of monetary policy to control life expectancy in the SSA economy, the impact of such policy will not be felt rapidly but slowly over time.
- Government health expenditure, hence, fiscal policy is found to be a better determinant of life expectancy in sub-Saharan Africa. The impact of government health expenditure on life expectancy is positive and significant; consequently, the government health expenditure is critical in terms of addressing the problem of low life expectancy SSA.
- Furthermore, the standard of living of the masses, measured by the per capita income, positively determines the extent of the life span of the masses.
- The impact of the CO<sub>2</sub> per capita (capturing environmental quality) is complex. The current value of the CO<sub>2</sub> is negatively related to the life expectancy while the immediate past value showed a positive relationship, both of which a given level alteration in their values were found to be statistically relevant in the explanation of the change in the rate of life expectancy.

Consequently, in the light of the above stated empirical findings, this study proposes that to improve the rate of life expectancy in sub-Saharan Africa, an expansionary monetary policy, complemented by non-contractionary fiscal policy in the form of growth in the government health expenditure, should be technically designed and implemented. Additionally, expenditure and other programmes by the government that could increase the living condition or standard of the people of sub-Saharan Africa should be pursued to improve the life expectancy of the people of the region. Finally, to improve life expectancy, the quality of the environment of sub-Saharan Africa needs to be given a thorough consideration since an increase in the emission of the CO<sub>2</sub> could dampen the life expectancy rate of the people of sub-Saharan Africa.

## References

- Acemoglu, D., & Johnson, S. (2007). Disease and Development: The Effect of Life Expectancy on Economic Growth. *Journal of Political Economy*, University of Chicago Press, 115(6), 925-985. <http://dx.doi.org/10.1086/529000>.
- Adekunle P. A., Yaaba, B.N., Stephen S. A., Ogbuehi F., Idris A., Zivoshiya P. B. (2018). Monetary Policy Transmission in Nigeria: How Important is Asset Prices Channel? *Microeconomics and Macroeconomics*. 6(3): 55-66 DOI: 10.5923/j.m2economics.20180603.01
- Adeoye, B., & Shobande, A.O. (2017). Monetary Policy Transmission Mechanism and Macroeconomic Aggregates in Nigeria. *Caleb Journal of Social and Management Sciences*. 3(2): 115–134. <https://doi.org/10.26772/cjsms/2017030206>
- Akanni, O.P. (2007). Oil Wealth and Economic Growth in Oil Exporting African Countries. AERC Research Paper 170. September
- AFDB, (2016). Improve the Quality of Life for the People of Africa. Annual Development Effectiveness Review. 46-45
- Arellano, M. and Bover, O. (1995). Another look at the Instrumental Variable Estimation of Error- Components Models. *Journal of Econometrics*, 68: 29–52.
- Ali, A. & Audi M. (2016). The Impact of Income Inequality, Environmental Degradation and Globalization on Life Expectancy in Pakistan: An Empirical Analysis. *MPRA*. 71112.
- Bitrus (2014). An Assessment of Monetary Policy Transmission Mechanisms in Nigeria. *IOSR Journal of Humanities and Social Science*. 19(3): 54-59. [www.iosrjournals.org](http://www.iosrjournals.org)
- Blundell, R. & Bond S.. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87: 115–43.
- Bowser, D. (2010). The Effect of Life Expectancy on Economic Growth in the United States. Population Association of America Conference, 1-58.
- Cervellati, M. & Sunde, U (2009). Life Expectancy and Economic Growth: The Role of the Demographic Transition. IZA DP Discussion Paper No. 4160 May.
- CIA (2017). Life Expectancy at Birth. World FactBook. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html>
- Fisher, I. (1930). *The Theory of Interest*. New York: Macmillan.
- Ghingian, M.L (2013). *Macroeconomics Theory*. 11<sup>th</sup> Revised and Enlarged Ed. Delhi. Vrinda Publishing
- Gilson, L and Mills, A. (1995). Health Sector Reforms in Sub-Saharan Africa: Lessons of the Last 10 Years. *Health Policy*. 32(1–3): 215-243 [https://doi.org/10.1016/0168-8510\(95\)00737-D](https://doi.org/10.1016/0168-8510(95)00737-D)

- Grossman. M. (1972). *The Demand for Health: A Theoretical and Empirical Investigation*. Columbia University Press.
- IMF (2004). *Health and Development: Why Investing in Health is Critical for achieving Economic Development Goals*, A compilation of articles from Finance & Development. Washington, DC. December. <http://www.imf.org>
- Keynes, J. M. (1936). *The General Theory of Employment Interest and Money*. London, Macmillian Publisher, (reprinted 2007)
- Leung, M.C.M. and Y. Wang, 2003. *Endogenous Health Care and Life Expectancy in a Neoclassical Growth Model*. Singapore: World Scientific Publishing Co.
- Lin, R., Chen, Y., Chien, L.C., and Chan, C.C. (2012). Political and Social Determinants of Life Expectancy in Less Developed Countries: A Longitudinal Study. *BMC Public Health*. 12-85 <http://www.biomedcentral.com/1471-2458/12/85>
- Mahyar, H. (2016). Economic Growth and Life Expectancy: The Case of Iran. *Studies in Business and Economics*. 11(1): 80-87. DOI 10.1515/sbe-2016-0007
- Monsef, A. and Mehrjard, A.S. (2015). Determinants of Life Expectancy: A Panel Data Approach. *Asian Economic and Financial Review*. 5(11): 1251-1257
- Okpara, G. C. (2010). Monetary Policy and Stock Market Returns: Evidence from Nigeria. *Journal of Economics*. 1(1): 13-21
- Ominyi, S. O. & Abu, J. (2017). Sustainable Economic Development and Environmental Degradation: Evidence from Nigeria. *IIARD International Journal of Economics and Business Management*. 3(3). 33-45. [www.iiardpub.org](http://www.iiardpub.org)
- Rahman, M.M., Khanam, R. & Rahman, M. (2018) Healthcare Expenditure and Health Outcome Nexus: New Evidence from the SAARC-ASEAN Region. *Globalization and Health*. 14-113. <https://doi.org/10.1186/s12992-018-0430-1>
- Sede, P. & Ohemeng, W. (2015). Socio-Economic Determinants of Life Expectancy in Nigeria. *Health Economic Review*. 3(4): 111-119.
- Sufian, A.J.M (2013). Life Expectancy and its Socioeconomic Determinants – A Discriminant Analysis of National Level Data. *International Journal of Humanities and Social Science*. 3(12) [Special Issue – June]. 303 - 312
- Timothy, P.O. (2018). Macroeconomic Implications of Low Life Expectancy in Sub-Saharan Africa Nations: A Panel Technique Approach. *Social Sciences*. 7(1): 7-12. DOI: 10.11648/j.ss.20180701.12.