*African Review of Economics and Finance | ISSN 2042-1478 | Volume 11 | Issue 2 | December 2019*

# Socioeconomic determinants of health status in Nigeria (1980 - 2014)

Temitope Sade Akintunde, Anthony Dotun Oladipo and Rasheed Oyaromade*

Department of Economics, Faculty of Social Sciences, Osun State University, Okuku Campus Okuku, Nigeria

* Corresponding author email: rasheed.oyaromade@uniosun.edu.ng

## Abstract

The health status of citizens is part of the wealth of nations. So, this study analysed the socioeconomic determinants of health status in Nigeria, (West) Africa's largest economy, using Cointegration and VECM methodology to analyse the relationship between the dependent variable (life expectancy rate) and the explanatory variables (primary school enrolment, per capita income, government expenditure on health, unemployment rate, gross capital formation and carbon dioxide emission) of health status. The results showed that carbon dioxide emission, gross capital formation, health expenditure, and unemployment rate were significant in explaining life expectancy in Nigeria, while other variables were not significant. Also, shocks from gross capital formation, unemployment, carbon dioxide emissions and primary school enrolment had negative effects on life expectancy rate while, the shocks from government spending on health and per capita income had positive response on life expectancy. These results imply that the Nigerian state authorities need to invest more in health care facilities, reduce unemployment, and ensure sustainable environment by making use of clean energy. Implementing the National Health Insurance Scheme in this regard could be a complementary step. These measures might sound wide-ranging, but they are justified not only because they can improve the health status of Nigerians but also contribute to driving sustainable development.

**Keywords:** Life expectancy; Cointegration; Vector Error Correction Model; Health; Africa.

## 1. Introduction

Most of the less developed countries have suffered multiple deprivations in terms of quality healthcare (Oxley, 2009 and Peters *et al.*, 2008). Poor funding of the health sector is one reason. There is increasing global health spending gap between the developed and developing countries. For instance, most African countries devote meagre percentage of their income to investing in healthcare. The current global expenditure on health is estimated to be about $4.1 trillion where the developed countries accounted for about 80 per cent and the less developed countries such as African countries accounted for only 20 per cent of the global health expenditure. This implies that the GDP allocation to health in most African countries is woefully inadequate and contrasts sharply with the situation in developed countries. In many developed countries, there have been dramatic increases in government spending on health as opposed to the developing countries. The United States, for example, spends 14.6 per cent of GDP on health sector while a meagre 4.17 per cent of GDP was allocated to the health sectors in Nigeria in 2017. The average total health expenditure in African countries stood at $135 per capita which is relatively smaller than the $3,150 spent on health by the developed countries in 2010 (Ichoku and Okoli, 2013). However, Clements *et al*. (2011) claim that emerging and less developed nations' overall health status is relatively poor compared to the developed countries and this could be as a result of lack of funds to improve health status and insufficient investment in the health sector is a gross oversimplification of the issues.

Given the World Health Organization's (WHO) conceptualization of health system as encompassing 'all the activities whose primary purpose is to promote, restore or maintain health' (Obeng-Odoom, 2012), it becomes obvious that there are, perhaps, far more serious drivers that determine the status of health system especially in developing countries. These other determinants are structural, historical, and more political-economic. The Nigerian healthcare system exemplifies these complexities. Many people cannot afford to pay for their health needs due, in part, to the lack of employment, widespread underemployment, and crippling inequality (see, for example, Jeff *et al*, 2008).

Therefore, the quality of healthcare in Nigeria is remarkably low and is getting worse, as, among others, people are forced to patronise substandard drugs and products leading to high mortality rate. Under five mortality rate stood at 100 per 1000 live births in 2017 while life expectancy at birth is only 54 years in 2017 (WDI, 2019). This life expectancy at birth is substantially below the average age of 83 years recorded in most of the developed countries (WDI,

2016). Even when Nigeria has experienced significant increases in some other sectors of the economy in recent times, these have not translated into quality healthcare. Indeed, child and maternal mortality rates are very high in Nigeria compared to some other African countries such as South Africa and Ghana. As reported in WDI (2019), the life expectancy at birth in 2017 is lower in Nigeria (54 years) than some other African countries such as South Africa (63 years) and Ghana (63).

Much research has been done about the health crisis in Nigeria, but most of these studies are snapshots with highly problematic methodologies. That is evidently the case of the several studies that have investigated health financing, incomes and health outcomes. For instance, Bloom and Canning (2008), Jack and Lewis (2007) and Backlund, Sorlie and Johnson (1996) have considered the link between health and income levels. Nonetheless, the direction of causality between health and income has remained a vigorous debates in the literature, (Bloom and Canning 2008 and Jack and Lewis, 2007). Health is seen as a cause and effect of income levels which portrays a two-way causality. One way is that higher income levels allow greater access to inputs that improve health such as food, clean water, sanitation, education and medical care. The other way is that health could affect income levels especially through workers' productivity, children's education, saving, investment and demographic structure. Ogunjuyigbe *et al*. (2003) and Sede and Ohemeng, (2015) have investigated the socio-economic determinants of health status in Nigeria but these studies are limited in terms of methodology, study period and explanatory variables.

As a result, there is no consensus yet about the variables that determines the health status of a country. While some studies see variables such as income, pharmaceutical expenditure and health expenditure others see education, environment and lifestyle as factors that affect health. Therefore, this study seeks to bridge this gap by examining the socio-economic determinants of the Nigerian health status and by determining the variables that influence the health outcomes of the Nigerian populace.

If so, it is pertinent to raise the following question: what has been the trend in the health status of Nigerians over the years? and what factors explain these trend? In order to provide answers to the questions raised, this study assessed the trend of life expectancy and maternal mortality from 1980 to 2014 and also examined the social and economic factors responsible for the state of health of Nigerians, using cointegration and vector error correction (VECM) methodology. The paper shows that carbon dioxide emission, gross capital formation,

health expenditure, and unemployment rate were significant in explaining life expectancy in Nigeria, while other variables were not significant. Also, shocks from gross capital formation, unemployment, carbon dioxide emissions and primary school enrolment had negative effects on life expectancy rate while, the shocks from government spending on health and per capita income had positive impact on life expectancy.

The rest of the article is organised into four sections. Section 2 presents a brief literature review while section 3 contains details about the data and methodology for the study. In section 4, results are presented and discussed. The final section concludes the paper.

## 2. Literature review

Health status is not a term that is commonly used or instantly understood. Most people, even those who are familiar with health care, would consider it a professional jargon. The major reason that this term has eluded simple definition is the lack of an agreed definition of health. The broad definition of health "as a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity" proposed by the World Health Organization (WHO) in 1948 has been repeated and supported for many years (Adenuga and Ibiyemi, 2010). Yet, few have tried to operationalize this definition despite its criticism as being too idealistic so that it can be used to assess the level and status of health among group of people (Bergner and Rothman,1987).

By health status we mean the level of health of an individual, a group or a population as assessed by those individual or objective measures, that is, a generic term that refers to the health of persons or population as good or poor when comparisons are made with data evidences and objective measures. Consequently, the determinants of health status refers to the range of personal, social, economic, and environmental factors that determine the health status of individuals or populations. And so, the determinants of health status according to the World Health Organisation (WHO) include: the social and economic environment, the physical environment, and the person's individual characteristics and behaviours, while for Issa and Quattara (2005), only factors such as where we live, the state of the environment, genetics, the income level, education level, and the relationships with friends and family all have considerable and substantive impacts on health status of individuals, whereas the more commonly considered factors such as access and use of health care services often have less of an impact.

In addition, the socio-economic determinants of health status are those factors embedded in our social, economic and physical environments. They are sometimes called root causes of health status and they have impacts on individual's health either directly or indirectly (Morris and Bailey, 2014). Some of the primary socio-economic determinants of health include: socioeconomic status, educational level, employment status, income, availability of medical facilities, housing, transportation and environmental conditions. These factors combine together affect the health status of individuals and communities. Whether people are healthy or not, is determined by their circumstances and environment.

Some researchers have investigated the socioeconomic determinants of health status. While some studies adopted the use of the time series data approach (Obermeyer and Potter, 1991; Clement *et al*., 2011; Ogunjuyigbe, 2011; Sede and Ohemeng, 2015), others adopted the panel data analytical approach (Ana Porcas *et al*., 2010; Or *et al*., 2005; Ramesh and Mirmirani, 2007; Shaw *et al*, 2005; Puig-Junoy, 1998; Verhoeven *et al*., 2007), even when there is no general consensus about the main factors that affect health status in the literature. Obermeyer and Potter (1991), for instance, observed that socio-economic factors are more significant than demographic factors in influencing healthcare service use and adoption of contraceptives. They opined that, although demographic factors may shape a woman's desire to make use of health services, the socio-economic state of an individual and her household determines her economic ability to do so. Similar findings can be found in Clement *et al.* (2011) who discussed the Nigerian experience in terms of health and education especially in the rural areas. They found that the overall health status is relatively poor compared to the developed countries due to lack of funds to improve health status.

In addition, Ogunjuyigbe *et al*. (2003) identified socio-economic determinants of health status in Nigeria to be responsible by certain factors which are high rate of poverty, poor state of Nigerian economy, low rate of political attention given to issues related to maternal healthcare in the country, other factors include inadequate policies and legislations, poor state of health care delivery system, illiteracy and weakened capacity of public institutions. Consequently, Sede and Ohemeng, (2015) investigated on the socioeconomic determinants of one of the health indicators that affect health status (life expectancy rate) in Nigeria. The study period covered from 1980 to 2011. The study found out that per capita income, educational enrolment and government health expenditure have not improved the life expectancy in Nigeria. The study by Sede and Ohemeng,

(2015) only considered causality and long run relationships among the variables, but the effects of each of the variables affecting health status were not captured. Similarly, some of these previous time series studies reviewed neglected the impact of the environmental variable factors like $CO_2$ emissions on the health status These neglected variables by the past studies have been added to our study because we believe that omissions of these neglected variables may have effects on the final health outcomes. Thus, this study gave priority to the impacts of some of the neglected variables in the past studies (unemployment rate and $CO_2$ emission) on health status.

Furthermore, Ana Pocas *et al*. (2010) examined the determinants of health status using life expectancy as proxy for health status of OECD countries' population. They found socioeconomic factors, health resources and lifestyle as the main determinants of health status using a panel data and their results showed that earnings, education and health resources are important factors affecting positively life expectancy. Or *et al*. (2005) showed that for 21 OECD countries, for the 1970-1998 period and using panel data regressions, the impact of health care measured by the number of doctors on life expectancy at birth and at age 65 varies significantly across countries. They found that the availability of advanced medical technology plays an important role too. In the same vein, Ramesh and Mirmirani (2007) analysed the health care system of 25 OECD countries, using a fixed-effects panel data model for the 1990-2002 periods. They estimated two regressions, one for life expectancy and another for infant mortality. However, their empirical results suggest that supply of physicians and education levels are highly significant and conditional factors for both the life expectancy and infant mortality. Similarly, Asiskovitch (2010) examined the impact of healthcare systems and health financing on the life expectancies of both women and men. He used the OECD Health in 2009 for 19 member countries for the period between 1990 and 2005. Using multi-level panel data regression test, he found out that public health spending had a positive and significant effect on life expectancy on both women and men but private funding was negatively related to life expectancy at birth.

Consequently, Shaw *et al*. (2005) studied the developed countries and they found that pharmaceutical expenditures have a positive effect on life expectancy at middle and advanced ages. According to these authors, another important determinant of life expectancy is lifestyle: they show empirical evidence that a decrease in tobacco consumption by about two cigarettes per day or an increase in fruit and vegetable consumption by 30 per cent raises life

expectancy approximately one year for 40-year-old females. Verhoeven *et al*. (2007), in an attempt to assess the efficiency of education and health spending in G7 countries, for the period 1998-2003, used in their analysis, an index of 28 OECD countries' average ranks for number of hospital beds, physicians and health workers per capita, immunizations and doctors' consultations. One of the findings of this study was that more immunizations and doctors' consultations were associated with higher efficiency in the health sector. Also, Backlund *et al*. (1996) examined the relationship between income and mortality among different levels of income. Their study made use of data from the National Longitudinal Mortality Study in United States. A cox proportional hazards model was used to test the variables. Their study revealed a smaller income-mortality gradient at high income levels than at low to moderate income levels in the working age populations for both sexes, before and after adjustment for other socio-economic variables.

Puig-Junoy (1998) studied the OECD countries for the 1960-1990 period adopting life expectancy at birth as health output and the number of physicians, non-physician health care employees and number of hospital beds as inputs. They found empirical evidence that, for similar health outputs, non-efficient countries use on average 40 per cent more inputs than efficient ones. Afonso and Aubyn (2006) estimated a semi-parametric model of the health production function using a two-stage DEA approach for OECD countries. They showed that life expectancy is strongly related to GDP per capita, education level and health behaviour (obesity and smoking habits). These above panel studies however, confirm the argument of this paper in terms of the relationship between health status indicators, per capita income and education, but neglected the impacts of other factors like unemployment and public spending on health on health status.

From the review of the literature above, there is perhaps unanimity about the variables that determine the health status of individuals and countries. While some studies see variables such as income, pharmaceutical expenditure and health expenditure others see education, environment and lifestyle as factors that affect health. This position brings to the fore the issue of the individuals well-being as conceived by the neoclassical economic doctrine of utility satisfaction and the recently emerging measures of subjective well-being (SWB) that attempts to estimate individuals well-being from personal perception (Botha and Snowball, 2015). Of particular relevance to Nigeria is the need for an understanding of the key determinants of health status of the populace in the absence of indices that quantify individuals SWB. Specifically, what is the trend of health status

of Nigerians and what are the factors that influence this trend? What are the explanatory powers of previously excluded variables in the estimation of health status of Nigerians?

## 3. Data and methodology

This study tries to answer these questions. In doing so, it makes use of secondary data. Data were sourced from World Development Indicators (WDI), published by the World Bank. The study period covered 35 years, from 1980 to 2014. This study adopted the Romer, Mankiw and Weil (1992) Neoclassical models of growth because they show the central role of human capital for economic growth by providing theoretical and empirical evidence, although, as discussed earlier, the discursive framework of the health question in Africa can usefully by placed in a wider political economy framework because questions of intergenerational health inequalities, race and class as well as power are poorly addressed by the human capital framework (Obeng-Odoom, 2012; Obeng-Odoom and Bockarie, 2018; Novignon and Lawanson, 2017). Consequently, prior to the second half of 1990s, the role of human capital was mainly related only to education. Few authors recognised the importance of other factors such as health and nutrition to have an impact on real per capita income. Thus, since good health is a crucial part of overall wellbeing and raises levels of human capital. Therefore, the inclusion of the health dimension as a component of human capital implies the need to measure the social, economic and environmental determinants of health status. For the health status, life expectancy at birth will be used as proxy. Studies such as Asiskovitch 2010, Storeng and Behague, 2017 and Rajkumar and Swaroop 2009 have made use of life expectancy at to proxy health status. We present the MRW (1992) growth model as follows:

Where $y(t)^{\alpha}\, e(t)^{\beta}\, h(t)^{\delta} \quad == \frac{Y}{AL,}, k = \frac{K}{AL}, e = \frac{E}{AL} \& h = \frac{H}{AL}$ (1)

This is a version of Solow's model which showed that it is possible to reconcile sustained growth differences between countries. This model assumes a Cobb Douglas aggregate production function defined as:

$$Y(t) = K(t)^{\alpha} A(t) L(t)\}^{\gamma} \quad (2)$$

Where Y is the output, L is labour and K is the capital

$$Y(t) = K(t)^{\alpha} E(t)^{\beta} H(t)^{\delta} \{(A(t)L(t)\}^{\gamma} \quad (3)$$

Where $\gamma = 1 - \alpha - \beta - \delta$ with $\alpha, \beta, \delta > 0$ and $0 < \gamma < 1$

In the above model, Y denotes aggregate health output outcome proxied by health status indicator such as life expectancy rate, K is the stock of physical capital proxied by gross capital formation, E represent environment, H is the human capital while L is labour. A is the technological level. Adopting equation 3 for our study, the reduced equation above of the health production function can be specified further as thus;

$$logQ(t) = \beta logE(t) + \delta logH(t) + \Pi logL(t) + \lambda logK(t) \quad (4)$$

Where, Q = *f* (*H, E, L, K*) is the expected health output proxied by health status indicators (life expectancy rate). E represents environment proxied by carbon dioxide emissions, H represents human capital proxied by income per capita, health expenditure and primary school enrolment. L represents labour proxied by unemployment. K represents physical capital proxied by gross capital formation. Based on the above equations the assumed linear equation of the model is presented as;

$$\ln LIFEX_t = \delta_1 \ln(PCI_t) + \beta_1 \ln(SCHENROL_t) + \delta_2 \ln(GHEX_t) + \delta_3 \ln(UNEM_t) + \beta_2 \ln(CO_{2t}) + \beta_3 \ln(GCF_t) + \mu_t \quad (5)$$

We estimate the equation above by regressing each of the regressand on the regressors; the dependent variable $LIFEX_t$ is the proxy for the health status. The independent variables are the socio-economic and environmental determinants of health status, where:

PCI denotes per capita income over time; SCHENROL denotes the primary school enrolment over time; GHEX denotes the government expenditure on health over time; UNEM denotes unemployment rate over time; $CO_2$ denotes carbon dioxide emission over time. GCF denotes gross capital formation over time.

From the neoclassical models, we expect per capita income, literacy level, government expenditure on health and gross capital formation to have positive effects on life expectancy. Also, we expect a negative impact on life expectancy, as unemployment and carbon dioxide emission increases.

To guide against biased and inconsistent results, we adopted the Augmented Dickey-Fuller (ADF) test (1981) and Philips-Perron (1988) for the unit root test which is an alternative non-parametric test for the presence of a unit root in a series which has an advantage over the ADF test in that it does not require a specific selection of the level of correlation while testing the same null and alternative hypotheses (Ambler and Pelgrin, 2010).Thereafter, we adopted a concurrent test to determining the long-run relationship among variables used

in this study by employing and applying the Johansen co-integration test (1991). This is important because variables that fail to converge in the long-run may be hazardous and misleading to policy making (Sede *et al*. 2015). We employed the use of vector auto-regression (VAR) models in this study. We adopted VAR firstly, because it does not give room for us to worry about which of the variables are endogenous or exogenous which was the main issue unaddressed in the previous studies that adopted ARDL. Secondly, forecast obtained from VAR models and VECM approaches have been argued to be better than the more complex simultaneous equations models (Mahmoud, 1984; McNees, 1986; Alagidede and Panagiotidis, 2010). Lastly, the VAR methodology gives room for each equation to be estimated with OLS method separately.

The variance decomposition is used to determine the relative magnitude of such impact. More specifically, it indicates the percentage change in the proxy for health status that may be attributed to the effect of expansion in socioeconomic and environmental variables. Such estimates are mostly useful for analysing impacts in a multivariate system as clearly demonstrated by (Sims, 1998 and Todd, 1998). Since the obtained coefficient of the VAR models are difficult to interpret, we overcome this criticism by estimating the impulse response function. This impulse response function examines the response of the dependent variable in the VAR to shocks in the error terms in our models. The VAR model for the proxy of health status and the socioeconomic and environmental variables in Nigeria shows that there is an existence of inter variable relationships between the variables under consideration. The inter relationship in the variables can be expressed as follows in a VAR model when taking LIFEX as a proxy for health status:

$$LLIFEX_t = a_{1t} + \sum_{i=1}^{n}\beta_{1i}\, LLIFEX_{t-i} + \sum_{i=1}^{n}\gamma_{1i} LPCI_{t-i} + \sum_{i=1}^{n}\lambda_{1i}\, LSCHENROL_{t-i} + \sum_{i=1}^{n}\delta_{1i}\, LGHEX_{t-i} + \sum_{i=1}^{n}\psi_{1i}\, LUNEM_{t-i} + \sum_{i=1}^{n}\Omega_{1i}\, LCO_{2\,t-i} + \sum_{i=1}^{n}\pi_{1i} LGCF_{t-i} + \mu_{1t} \quad (6)$$

$$LPCI_t = a_{2t} + \sum_{i=1}^{n}\beta_{2i}\, LLIFEX_{t-i} + \sum_{i=1}^{n}\gamma_{2i} LPCI_{t-i} + \sum_{i=1}^{n}\lambda_{2i}\, LSCHENROL_{t-i} + \sum_{i=1}^{n}\delta_{2i}\, LGHEX_{t-i} + \sum_{i=1}^{n}\psi_{2i}\, LUNEM_{t-i} + \sum_{i=1}^{n}\Omega_{2i}\, LCO_{2\,t-i} + \sum_{i=1}^{n}\pi_{1i} LGCF_{t-i} + \mu_{2t} \quad (7)$$

$$LSCHENROL_t = a_{3t} + \sum_{i=1}^{n}\beta_{3i}\, LLIFEX_{t-i} + \sum_{i=1}^{n}\gamma_{3i} LPCI_{t-i} + \sum_{i=1}^{n}\lambda_{3i}\, LSCHENROL_{t-i} + \sum_{i=1}^{n}\delta_{3i}\, LGHEX_{t-i} + \sum_{i=1}^{n}\psi_{3i}\, LUNEM_{t-i} + \sum_{i=1}^{n}\Omega_{3i}\, LCO_{2\,t-i} + \sum_{i=1}^{n}\pi_{1i} LGCF_{t-i} + \mu_{3t} \quad (8)$$

$$a_{4t} + \sum_{i=1}^{n}\beta_{4i}\, LLIFEX_{t-i} + \sum_{i=1}^{n}\gamma_{4i} LPCI_{t-i} + \sum_{i=1}^{n}\lambda_{4i}\, SCHENROL_{t-i} + \sum_{i=1}^{n}\delta_{4i}\, GHEX_{t-i} + \sum_{i=1}^{n}\psi_{4i}\, LUNEM_{t-i} + \sum_{i=1}^{n}\Omega_{4i}\, LCO_{2t-i} + \sum_{i=1}^{n}\pi_{1i} LGCF_{t-i} + \mu_{4t} \quad (9)$$

$$LUNEM_t = a_{5t} + \sum_{i=1}^{n}\beta_{5i}\, LLIFEX_{t-i} + \sum_{i=1}^{n}\gamma_{5i} LPCI_{t-i} + \sum_{i=1}^{n}\lambda_{5i}\, LSCHENROL_{t-i} + \sum_{i=1}^{n}\delta_{5i}\, LGHEX_{t-i} + \sum_{i=1}^{n}\psi_{5i}\, LUNEM_{t-i} + \sum_{i=1}^{n}\Omega_{5i}\, LCO_{2\,t-i} + \sum_{i=1}^{n}\pi_{1i} LGCF_{t-i} + \mu_{5t} \quad (10)$$

$$LCO_{2t} = a_{6t} + \sum_{i=1}^{n}\beta_{6i}\, LLIFEX_{t-i} + \sum_{i=1}^{n}\gamma_{6i} LPCI_{t-i} + \sum_{i=1}^{n}\lambda_{6i}\, LSCHENROL_{t-i} + \sum_{i=1}^{n}\delta_{6i}\, LGHEX_{t-i} + \sum_{i=1}^{n}\psi_{6i}\, LUNEM_{t-i} + \sum_{i=1}^{n}\Omega_{6i}\, LCO_{2\,t-i} + \sum_{i=1}^{n}\pi_{1i} LGCF_{t-i} + \mu_{6t} \quad (11)$$

$$LGCF_t = a_{7t} + \sum_{i=1}^{n}\beta_{6i}\, LLIFEX_{t-i} + \sum_{i=1}^{n}\gamma_{6i} LPCI_{t-i} + \sum_{i=1}^{n}\lambda_{6i}\, LSCHENROL_{t-i} + \sum_{i=1}^{n}\delta_{6i}\, LGHEX_{t-i} + \sum_{i=1}^{n}\psi_{6i}\, LUNEM_{t-i} + \sum_{i=1}^{n}\Omega_{6i}\, LCO_{2\,t-i} + \sum_{i=1}^{n}\pi_{1i} LGCF_{t-i} + \mu_{7t} \quad (11)$$

More so, to achieve the objectives of this study, we further employed VAR model analysis to estimate the inter relationships among the variables with the standard VECM approach followed by Alagidede and Panagiotidis (2010) and Moore-Pitt and Strydom, (2018). The Akaike information criterion (AIC) was used to determine the lag length for the VAR model.

Where, $LLIFEX_t$ = Log of life expectancy over time; $LPCI_t$ = Log of per capita income over time; $LSCHENROL_t$ = Log of the primary school enrolment over time; $LGHEX_t$ = Log of government health expenditure over time; LUNEMt = Log of unemployment rate in Nigeria over time;$LCO_{2t}$ = Log of carbon dioxide emission over time. $LGCF_t$= Log of gross capital formation over time.

J= 1, 2, 3, ..., 6. N = Total number of lag length

$\beta_{it}$ = Coefficients of life expectancy

$\sigma_{it}$ = Coefficient of maternal mortality rate

$\Upsilon_{it}$ = Coefficient of per capita income

$\lambda_{it}$ = Coefficient for primary school enrolment

$\delta_{it}$ = Coefficient of health expenditure

$\psi_{it}$ = Coefficient for Unemployment

$\Omega_{it}$ = Coefficient of carbon dioxide emission

$\mu_{it}$= denotes the Error term

$\pi_{it}$= Coefficient of gross capital formation

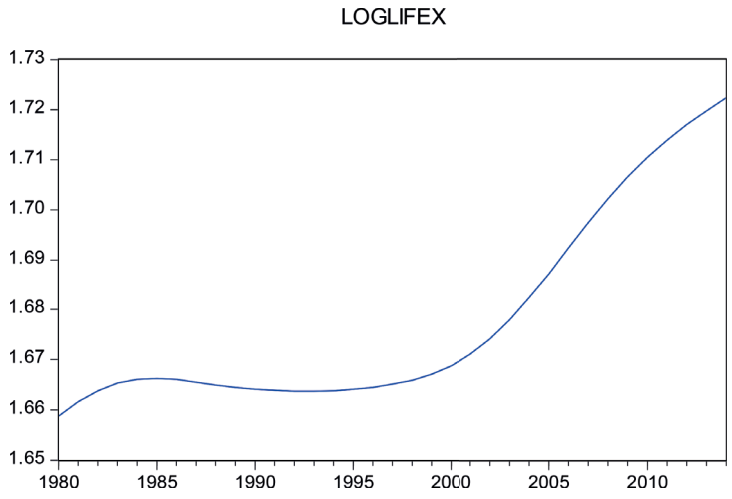
## 4. Results and discussion

### *4.1. Trends in life expectancy rate from 1980 – 2014*

Nigeria witnessed tremendous economic progress in the 1970s due mainly to the high revenue from crude oil exports. However, the glut in international oil market in the early 1980s and the resulting weak economic fortunes for the country led to series of policies directed at lessening the impact of the crisis. Prior to 1980, life expectancy for both women and men was at its lowest ebb with 38.7 years and Nigeria was ranked as 153rd country in the world (World Health Organization, 2014). However, there was an improvement in life expectancy for the country in 1980 when it stood at 45 years with the country ranked at 159th in the world. In 1990, that is few years after the structural adjustment programme in 1980s, there was a low increase in life expectancy rate at about 4 per cent which probably may be explained due to the structural changes in the economy as a result of recession witnessed during this time. In 1990, the life expectancy rate rose to 47.2 years and Nigeria was ranked 170th in the world ranking thereby showing no improvement in ranking (World Health Organization, 2014).

In the millennium year 2000, a decline of less than -1 per cent affected the life expectancy rate and there was a fall from 47.2 years to 46.9 years and Nigeria became ranked as 169th in the world (World Health Organization, 2014). Thus, with the introduction of millennium development goals in the year 2000 in which reduction in child and maternal mortality rate is among the global goals and objectives, Nigeria improved tremendously and it recorded the highest increase of about 10 per cent at 52 years of life expectancy and was ranked as 176th in the world ranking in 2010. In 2014, the country recorded a 2 per cent rise and this placed life expectancy to 53 years in Nigeria and maintained the 176th position in ranking and this became worrisome for Nigerians and the Nigerian government since life expectancy is a measure of overall quality of life and it indicates the potential return on investment in human capital in the various countries of the world. Unfortunately, Nigeria as the giant of Africa has been ranked so low in life expectancy and it is below several African countries in the world such as Algeria, Libya, Egypt, Kenya, Benin, and Liberia. Nigeria is only above few African countries like Gabon, Namibia, Zambia, Somalia and South Africa.

Figure 1: Log of Life Expectancy Rate in Nigeria (1980 – 2014)

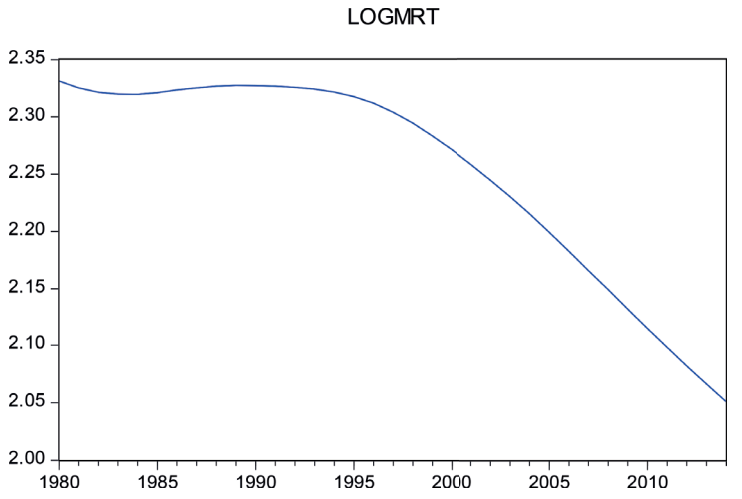



*Source:* Authors' computation.

### *4.2. Trends in maternal mortality rate from 1980 – 2014*

To improve maternal mortality rate and other health outcomes, several policies were implemented by the government, especially since the inception of the current democratic dispensation. However, these policies have resulted in varied health outcomes over the years. Maternal mortality rate (per 1,000 live births) in Nigeria was 112.5 as of 2014. The trend in maternal mortality rate as shown in Figure 2, indicates an improvement over the past 34 years. This indicator reached a maximum value of 214.4 in 1980 and a minimum value of 112.5 in 2014. Nigeria in the recent times is estimated to have an MMR of 560 maternal deaths per 100,000 live births (World Health Organization and United Nations Children's Fund, 2014). It is interesting to note that maternal mortality in Nigeria has declined by 52 per cent between 1990 and 2015 and this makes the average annual percentage change in maternal mortality rate between 1990 and 2014 was -3.1 per cent. Nigeria therefore, is classified as making progress towards maternal health.

FIGURE 2: LOG OF MATERNAL MORTALITY RATE IN NIGERIA (1980 – 2014)




*Source:* Authors' computation.

### *4.3. Unit root tests*

The results from the test based on Augumented Dickey Fuller and Philip-Perron are reported in Tables 1 and 2. The results from the ADF showed that one of the variables were stationary at levels without intercept but became stationary at first difference with intercept (GCF), while some were not stationary at levels but became stationary after first difference (CO2 emissions, LIFEX, GHEX, SCHENROL, PCI, and UNEM). In other words, the variables are integrated of order 1(i.e. I (1) series. In the ADF test results, all the variables were significant at (1 per cent, 5 per cent and 10 per cent) levels except MRT that was significant at 1 per cent and 10 per cent significance levels. From the Philip Perron test, the results showed that only GCF was stationary at levels I(0) while other variables like CO2, LIFEX, GHEX, SCHENROL, PCI and UNEM became stationary at first different and the series are integrated of order I(1). In similar way, all the variables were significant at (1 per cent, 5 per cent, and 10 per cent) levels except for GCF that became stationary only at 5 per cent.

Table 1: Unit Root Test Results (Augmented Dickey Fuller Test)

| | Without Intercept | | | With Intercept | | | |
|---|---|---|---|---|---|---|---|
| Variables | Levels | 1st Difference | I(d) | Levels | 1st Difference | I(d) | Decision |
| LCO2 | -1.189034 | -6.457319**** | I(1) | -2.129695 | -6.451112**** | I(1) | I(1) |
| LGHEX | 2.466590 | -6.366415**** | I(1) | 1.722443 | -5.623525**** | I(1) | I(1) |
| LLIFEX | 2.227036 | -7.914423**** | I(1) | 0.532298 | -8.675200**** | I(1) | I(1) |
| LPCI | 5.909533 | -0.852757 | I(1) | 0.195320 | -5.435471**** | I(1) | I(1) |
| LSCHENROL | 0.093570 | -4.740449**** | I(1) | -2.915781 | -4.663208**** | I(1) | I(1) |
| LUNEM | 2.008522 | -7.513003**** | I(1) | -0.553980 | -8.115481**** | I(1) | I(1) |
| LGCF | 3.176621** | None | I(0) | -1.164511 | -3.223701**** | I(1) | I(1) |

*Notes:* **Null hypothesis rejected at 1 per cent. *Null hypothesis rejected at 5 per cent. ***Null hypothesis at 10 per cent. ****Null hypothesis rejected at all levels (1 per cent, 5 per cent and 10 per cent).

Table 2: Unit Root Test Results (Phillip Perron)

| | Without Intercept | | | With Intercept | | | |
|---|---|---|---|---|---|---|---|
| Variables | Levels | 1st Difference | I(d) | Levels | 1st Difference | I(d) | Decision |
| LCO2 | -1.225265 | -6.443710**** | I(1) | -2.124824 | -6.465372**** | I(1) | I(1) |
| LGHEX | 1.772009 | -6.435671**** | I(1) | 0.899971 | -6.716954**** | I(1) | I(1) |
| LLIFEX | 2.132206 | -7.751425**** | I(1) | 0.410663 | 8.785513**** | I(1) | I(1) |
| LPCI | 5.347465 | -3.055559**** | I(1) | 0.180256 | -5.430398**** | I(1) | I(1) |
| LSCHENROL | 0.077822 | -4.709449**** | I(1) | 2.066649 | -4.627439**** | I(1) | I(1) |
| LUNEM | 6.302075 | -7.627586**** | I(1) | 0.209604 | -21.16728**** | I(1) | I(1) |
| LGCF | 3.001834* | None | I(0) | -2.079702* | None | I(0) | I(0) |

*Note:* **Null hypothesis rejected at 1 per cent. *Null hypothesis rejected at 5 per cent.***Null hypothesis at 10 per cent. ****Null hypothesis rejected at all levels (1 per cent, 5 per cent and 10 per cent).

### *4.4. Cointegration test*

From the test statistic of trace and maximum Eigen-values, result shows that there are at least five cointegrating equations among the variables. This therefore gives the basis to reject the null hypothesis of no co-integration among the variables at 5 per cent levels. This confirms the existence of a long run relationship between the short-run dynamics and the long run equilibrium of the model. See Table 3 below for the detailed results:

Table 3: Cointegration Results with Life Expectancy as the Dependent Variable

| Hypothesized No of CE(s) | Eigen Value | Trace Statistic | Critical Value | Prob |
|---|---|---|---|---|
| None* | 0.98 | 363.03 | 125.62 | 0.00 |
| At most 1* | 0.90 | 218.30 | 95.75 | 0.00 |
| At most 2* | 0.82 | 140.91 | 69.82 | 0.00 |
| At most 3* | 0.67 | 83.47 | 47.86 | 0.00 |
| At most 4* | 0.62 | 46.81 | 29.78 | 0.00 |
| At most 5 | 0.32 | 14.76 | 15.49 | 0.06 |
| At most 6 | 0.06 | 2.19 | 3.84 | 0.14 |

*Notes:* Trace test indicates at 5 cointegrating equations at the 0.05 level.
*Source:* Authors' computation.

### *4.5. Forecast error variance decomposition results*

The thrust of the variance decomposition is to measure and forecast the proportion of error variance in one variable explained by shocks from itself and other variables. This therefore, allows the variations in the variables to be decomposed into the various components including its own component. The magnitude of this impact can be ascertained from variance decomposition of the VECM, which indicates the relative contribution of past periods of life expectancy to its current value as well as the contributions made by other explanatory variables to its value. The variance decomposition for and life expectancy alone is shown because it is the dependent variable.

Thus, from Table 4, Per capita income (PCI), Primary school enrolment (SCHENROL), and Unemployment (UNEM) did not give explanation to the variation in LIFEX in the first period. This supports findings of (Kabir 2008, Anand and Ravallion 1993), who also confirmed that over the last ten years, many of the developing countries have witnessed gains in per capita income, primary school enrolment and unemployment but still demonstrated decrease in life expectancy. The Nigerian situation may be explained by the uneven distribution of income among the population and the highly non-egalitarian nature of the country. Also, the gross fixed capital formation (GCF) accounts significantly for variation in life expectancy in the 10 periods. The shock from GCF decreased further from 83 per cent to 39 per cent between the first and second period and 64 per cent to 60 per cent between the ninth and tenth period with other variables accounting for less than 52 per cent in these periods. Therefore, only GCF and government health expenditure (GHEX) provide appreciable explanations (52 per cent and 39.4 per cent) in the second period for shocks to life expectancy

while other variables account for an average of 2 per cent each during the same period. While explanation from own shock accounts for (13.5 per cent) variation in life expectancy (LIFEX) in the first period, it also decreased further from 13.5 per cent to 1.7 per cent between the first and tenth period.

Table 4: Variance Decomposition Results for Life Expectancy

| Period | S.E | LOGCO2 | LOGGCF | LOGGHEX | LOGLIFEX | LOGPCI | LOG SCHENROL | LOGUNEM |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.015854 | 3.543546 | 82.87121 | 0.045317 | 13.53992 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.057343 | 1.178734 | 39.49240 | 52.77018 | 5.027031 | 0.000403 | 0.180495 | 1.350755 |
| 3 | 0.099981 | 4.746605 | 52.12843 | 34.92699 | 5.945953 | 0.720597 | 0.480930 | 1.050491 |
| 4 | 0.155504 | 4.717537 | 55.65370 | 17.63325 | 6.957693 | 7.222912 | 1.201001 | 6.613907 |
| 5 | 0.222722 | 7.074999 | 51.70837 | 14.97480 | 6.838007 | 8.604739 | 1.336663 | 9.462425 |
| 6 | 0.315632 | 7.254426 | 53.34467 | 10.10256 | 6.197706 | 8.752971 | 1.525484 | 12.82218 |
| 7 | 0.425265 | 8.196203 | 51.81374 | 10.28130 | 5.129806 | 8.059669 | 0.872866 | 15.64641 |
| 8 | 0.536099 | 14.07186 | 58.01160 | 6.477218 | 4.472219 | 5.379237 | 0.720207 | 10.86767 |
| 9 | 0.709685 | 2.719484 | 64.76210 | 5.590711 | 2.080662 | 3.580979 | 2.167854 | 19.09821 |
| 10 | 0.904978 | 2.363386 | 60.37059 | 18.97894 | 1.686203 | 2.221099 | 1.350337 | 13.02945 |

*Source:* Authors' computation.

In summary, only emission from carbon dioxide (CO2), the gross fixed capital formation (GCF) and Unemployment (UNEM) offer significant explanations to life expectancy. This conforms to the findings of Anand and Ravallion (1993), but contrary to the findings of Wilkinson which found per capita income to be a significant explanation to health status. This implies that the gross fixed capital formation (GCF) has the highest power while the primary school enrolment (SCHENROL) has the lowest power to explain the variationsin LIFEX in Nigeria.

### *4.6. Impulse response function*

Here we looked at how the variables in the VECM model shows the response of each of the variable in the VECM system to different shocks. This identifies the responsiveness of the dependent variable in the VAR system when a shock is put to the error term. Simply put, it is a shock to a VAR system. Thus, for calculating

impulse responses, the ordering of the variables is very important. Cholesky adjusted method was used for the ordering.

Table 5: Response of LOGLIFEX to Shocks

| Periods | LOGCO2 | LOGGCF | LOGGHEX | LOGLIFEX | LOGPCI | LOG SCHENROL | LOGUNEM |
|---|---|---|---|---|---|---|---|
| 1 | 0.002984 | -0.014432 | -0.000337 | 0.005834 | 0.000000 | 0.000000 | 0.000000 |
| 2 | -0.005464 | -0.033020 | 0.041655 | 0.011457 | -0.000115 | 0.002436 | -0.006665 |
| 3 | -0.020874 | -0.062548 | 0.041906 | 0.020714 | -0.008486 | -0.006491 | -0.007784 |
| 4 | -0.025813 | -0.090814 | 0.027797 | 0.032987 | -0.040922 | -0.015568 | 0.038657 |
| 5 | -0.048670 | -0.110418 | 0.056252 | 0.041346 | -0.050217 | -0.019304 | 0.055628 |
| 6 | -0.060972 | -0.165813 | -0.051345 | 0.052748 | -0.066721 | -0.029269 | 0.089889 |
| 7 | -0.087153 | -0.201398 | 0.092354 | 0.055703 | -0.076524 | -0.007670 | 0.124590 |
| 8 | -0.160063 | -0.270225 | 0.004686 | 0.059800 | -0.029735 | -0.022166 | 0.054198 |
| 9 | -0.087158 | -0.186599 | -0.046286 | 0.324077 | 0.087030 | -0.054507 | -0.236900 |
| 10 | -0.094778 | -0.224971 | 0.424219 | 0.255623 | 0.006263 | -0.011878 | -0.101247 |

*Source:* Authors' computation.

From the results in Table 5, the response of life expectancy to carbon dioxide emission when a positive shock of one standard deviation is given is a negative reaction; this reveals that a shock in carbon dioxide emission rate results to a decrease in life expectancy. This implies that life expectancy (LIFEX) responds negatively to shocks in carbon dioxide emissions ($CO_2$). Also, if one standard deviation positive shock is given to government expenditure on health, life expectancy will respond negatively to shocks in LIFEX in the first, sixth and ninth periods and becomes positive and significant in the fifth, seventh, eighth and tenth period which means that when there is a positive shock in government expenditure on health, life expectancy will be positive there by showing a positive relationship between LOGLIFEX and LOGGHEX. This conforms to the findings of Sede *et al*, (2015), Elola *et al.*, 1995 which found a positive relationship between government expenditure on health and life expectancy but negates that of Kabir, (2008).

Furthermore, the response of life expectancy to its own shock is also positive all through the 10 periods even when a positive standard deviation shock is introduced. Similarly, Life expectancy (LIFEX) responds negatively to shocks in gross fixed capital formation. There had been infrastructural decay in Nigeria, even in the health sector and this could have accounted for the negative shock of gross capital formation to life expectancy. It reveals that a shock in gross fixed

capital formation results to a decrease in life expectancy. Per capita income remains both positive and negative starting with zero in period 1, negative between period 2 and 8 and thereafter, becomes positive in periods 9 and 10 in its response to life expectancy. Though the shock was not stable but towards the 9th period it became positive. Over the years, in the long run, increase in per capita income could bring about better well-being which eventually would lead to increase in life expectancy in Nigeria.

Consequently, a positive shock on primary school enrolment (SCHENROL) initiated no response at the first year on life expectancy but by the second year, there was a positive response. However, for the rest of the period, it revealed a negative response on life expectancy. This contradicts the a priori expectation because it is expected that when people are educated, they are better informed and they become healthier. In Nigeria, there exist several cases of self-medication and this could be counterproductive to people's health. A positive shock on unemployment revealed no response at the 1st period but at the 2nd period, the response was negative. At the 4th period it was positive but by the 9th and 10th period, it was negative. Over time, high unemployment level could bring about low life expectancy.

## 5. Conclusion

The factors that influence the health status of people are multifaceted as the understanding of the health system itself requires a delve into historical foundation and political economic considerations. In Nigeria, the health status of the people has been determined to a great extent by their socioeconomic characteristics and government intervention in the health system. We have examined the socio-economic factors affecting life expectancy rate in Nigeria over a period of 35 years. The determinants were the per capita income, primary school enrolment, public health expenditure, carbon dioxide emissions and unemployment rate. Gross capital formation, unemployment, carbon dioxide emissions and to some extent government spending on health were significant in explaining the health status in Nigeria. However, per capita income and primary school enrolment were not so significant. It was revealed that shocks from gross capital formation, unemployment, carbon dioxide emissions and primary school enrolment had negative responses to life expectancy rate while, the shocks from government spending on health and per capita income had positive response on life expectancy.

Additional research is needed to probe other aspects of health status, of course, but even this limited study has important implications for health policy. In order to improve the health status of Nigerians, more investment in the area of physical capital or infrastructure had to be taken. This is especially in the health sector because most of the limited health facilities are either not working or have become obsolete. Nigerians should be encouraged to make use of the renewable or clean energy as a source of energy. The National Health Insurance Scheme should be fully implemented so as enable people to afford quality and better health care. This will reduce the burden of paying out-of-pocket money. The state could spend more on health and the level of unemployment should be reduced to its barest minimum. As a function of poverty and inequality, self-medication could be ameliorated with greater inclusive development, but more direct policies such as closer state scrutiny through the implementation of existing and renewed regulations could be helpful.

## Biographical Notes

**Temitope Akintunde** is a Senior Lecturer at the Department of Economics, Osun State University, Nigeria. She holds a Doctorate degree in Economics from the Obafemi Awolowo University, Ile-Ife, Nigeria. Her research interests are in the area of Health Economics and Development Economics.

**Anthony Oladipo** is a lecturer at the Department of Economics, Osun State University, Osogbo, Nigeria. He holds a Master's degree in Economics from the University of Ibadan, Ibadan, Nigeria and is currently enrolled for a Ph.D in Economics at the University of Ibadan, Ibadan, Nigeria. His research interests are in the area of International Economics, Health Economics and Development Economics.

**Rasheed Oyaromade** is a Senior Lecturer at the Department of Economics, Osun State University, Nigeria. He holds a Doctorate degree in Economics from the University of Ibadan, Ibadan, Nigeria. His research interests are in the area of Monetary Economics, International Economics and Development Economics.

## Acknowledgements

We are grateful to the editors and two anonymous reviewers who provided constructive comments that have helped in improving this paper. The usual caveat applies.

## References

Ambler, S and Pelgrin, F. (2010). Time Persistent Control in Non-Linear Models. *Journal of Economic Dynamics and Control*, Elsevier, vol. 34(10), pp. 2215-2228.

Afonso, A. and Aubyn, M. (2006). Relative Effeciency of Health Provision: A DEA Approach with Non-Discretionary Inputs. ISEG-UTL Economics Working Paper,, 33.

Adenuga, O. and Ibiyemi, A. (2010). An Assessment of the State of Maintenance of Public Hospital Buildings in Southwest Nigeria. *The Australian Journal of Construction Economics and Buildin*g, 9 (2).

Alagidede P. and Panagiotidis, T. (2010). Can Common Stocks Provide a hedge Against Inflation? Evidence from African Countries. *Review of Financial Economics*, 19, 91-100.

Anand, S and Ravallon, M. (1993). Human Development in Poor Countries: On the Role of Private Income and Public Services. *Journal of Economic Prospects*, 7(2), 133-150.

Asiskovitch S. (2010). Gender and Health Outcomes: The Impact of Healthcare Systems and their financing on Life Expectancies of women and men. *Soc Sci Med* 70(6), 886-895.

Backlund E, Sorlie P.D. and Johnson N.J. (1996). The Shape of the relationship between Income and Mortality in the United States: Evidence from the National Longitudinal Mortality Study. *Annals of Epidemiology*, 6(1), 12-20.

Bergner, M and Rothman, M. (1987) Health Status Measures: An Overview and Guide for Selection. *Annual Review of Public Health*, 8: 191-210.

Bloom, D.E & Canning, D. (2008). Population Health and Economic Growth. Commission on Growth and Development Working Paper, No. 24 Washington DC: World Bank.

Botha, F. and Snowball, J. (2015), Subjective Well-Being in Africa. *African Review of Economics and Finance*, 7(1), 1-5.

Clements, B. Coady, D. Shang, B. and Tyson, J. (2011). Health Care Finances. *Journal of Financial Development*, 3(1), 15-23.

Dickey, D. and Fuller, W. (1981). Likelihood Ratios for Auto-regressive Time Series. *Econometrica*, 49, 1057-1172.

Elola, J. Daponte, A and Navarro, V. (1995).Health Indicators and the Organization o Healthcare Systems in Western Europe. *Am J Public Health*, 85(10): 1397-1401.

Hitiris, T. and Posnet, J. (1992). The Determinants and Effects of Health Expenditure in Developed Countries. *Journal of Health Economics*, 11, 173-181.

Ichoku H.E & Okoli, C.I. (2013). Fiscal Space For Health Financing in Nigeria. *African Journal ofHealth Economics*, 2(2), 1-18.

Issa, H. and Quattara, B. (2005). The Effect of Private and Public Health Expenditure on Infant Mortality Rates: does the level of development matters? University of Wales, Swansea.

Jack, W & Lewis, M. (2007).Health Investment and Economic Growth: Macroeconomic Evidence and Microeconomic Foundations. in *Health and Growth: Commission on Growth and Development*. Edited by (Spence, M & Lewis, M). Washington, DC: International Bank for Reconstruction and Development/World Bank Publications. 1- 40.

Jeff, B., Taara, C. and Rich, F. (2008). Private Sector Health Assessment, Bethesda, MD: Private Sector Partnerships-One Project, Abt Associates Inc.

Johansen, S and Joselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with application to the Demand for Money. *Oxf Bull Econ Stat*, 52, 169-210.

Kabir, M. (2008). Determinants of Life Expectancy in Developing Countries. *Journal of Development Area*, 41, 185-204.

Lopez, Rivera and Currais. (2005). Global Burden of Disease and Risk Factors. NewYork: Oxfrod University Press.

Mahmoud, B. (1984). Accuracy in Forecasting: A Survey. *Journal of Forecasting*, vol.3 (2), pp. 139-159.

Mankiw, N. Romer, D. and Weil, N. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics* (107), 407-437.

McNees, K. (1986). Forecasting Accuracy of Alternative Techniques: A Comparison of U.S. Macroeconomic Forecasts. *Journal of Business and Economic Statistics*, vol. 4(1), 5-15.

Moore-Pitt, P. & Strydom, B.S. (2018). Equities as a Hedge Against Inflation in South Africa. *African Review of Economics and Finance*, 9(1), 156 -178.

Morris, C., and Bailey, K. (2014). Measuring Healthcare Quality: An Overview of Quality Measures, Issue Brief, Families USA. 1201 New York Avenue NW, Suite 1100 Washington, DC, US info@familiesusa.org.

Nixon, J. and Ulmann, P. (2006). The Relationship between Health Care Expenditure and Health Outcomes: Evidence and Caveats for a Causal Link. *European Journal of Health Economics*, 7(1), 7-18.

Novignon, J and Lawanson A.O. (2017), Health Expenditure and Child Health Outcomes in sub-Saharan African. *African Review of Economics and Finanace*, 9(1), 96-121.

Obeng-Odoom, F. (2012), Health, Wealth and Poverty in Developing Countries: Beyon the State, Market and Civil Society. *Health Sociology Review*, 12(2), 156-164.

Obeng-Odoom, F. and Bockarie, M. M. B. (2018), The Political Economy of Ebola Virus Disease. *Social Change*, 48(1), 18-35.

Obermeyer, Makhlout and Potter. (1991). Maternal Health Care Utilization in Jordan. A Study of Patterns and Determinants. *Studies in Family Planning*, 22, 177-187.

Ogunjuyigbe, O. and Liasu, A. (2003). The Social and Economic Determinants of Maternal Morbidity and Mortality in Nigeria.

Oxley and Howard. (2009). Policies for Healthy Ageing: An Overview. OECD Health Working Papers.

Phillips, P and Perron P. (1988). Testing for Unit Roots in Time Series Regression. *Biometrika*, 75, 335-346.

Pocas, A and Isabel, A. (2012). The Interrelations between Health, Human Capital and Economic Growth: Empirical Evidence from the OECD Countries and Portugal. Economic da Universidade de Coimbia para ostencao do grau de Doutor, 1-72.

Pocas, A. and Soukiazis, E. . (2010). Health Status Determinants in the OECD Countries: A Panel Data Approach with Endogenous Regressors. GEMF .

Puig-Junoy, J. (1998). Measuring Health Production Performance in the OECD. *Applied Economics Letters*, 5, 255-259.

Rajkumar, A. S. and Swaroop, V. (2004). Public Spending and Outcomes: Does Governance Matter? World Bank Working Papers No. 2840, Washington: World Bank.

Ramesh, M. and Mirmirani, S. (2007). An Assessment of OECD Health Care System using Panel Data Analysis.

Sede, P. and Ohemeng, W. (2015). Socio-Economic Determinats of Life Expectancy in Nigeria. *Springer Journal of Health Economics Review*, 5, 2-10.

Shaw, J. Horrace, W and Vogel, R. (2005). The Determinants of Life Expectancy: An Analysis of OECD Health Data. *Southern Economic Journal*, 71(4), 768-783.

Shittu, J. (2016). Brief on SDGs: Mapping Priorities for Implementation in Nigeria. Center for Public Policy Alternatives, 3rd Floor West wing Catholic Mission Lagos Island.

Sims, C. (1998). Comment on Glenn Redebusch's "Do Measures of Monetary Policy in a VAR make sense? *International Economic Review*, 39(4), 933-941.

Storeng, K.T & Behague, D.P. (2017). Guilty until Proven Innocent: The Contested Use of Maternal Mortality Indicators in Global Health. *Critical Public Health Journal*, 27(2).

Thomas, D. Strauss, J. and Henriques, M. (1990). Child Survival Height for Age and Household Characteristics in Brazil. *Journal of Development Economics*, 33, 197-234.

Todd, R. (1990). Vector Auto-regression Evidence on Monetarism: Another Look at the Robustness Debate. *Federal Reserve Bank of Minneapolis Quarterly Review*, 19-37.

Uche, O. and Uche, I. (2014). Building a Solid Healthcare System in Nigeria: Challenges and Prospects. *Academic Journal of Interdisciplinary Studies* MCSER Publishing, Rome-Italy, 3(6), 501-510.

Verhoeven, M. (2007). Education and Health in G7 Countries: Achieving Better Outcomes with Less Spending. IMF Working Paper.

WDIs (2016). World Development Indicators, Life Expectancy at Birth, Female and Male years. http://data.worldbank.org/indicator, Accessed online, January, 2018.

WHO. (2000). World Health Report. Geneva: WHO.

WHO. (2014). World Health Report. Geneva: WHO.

Williamson J.B and Boehmer, U. (1997). Female Life Expectancy, Gender Stratification, and Level of Economic Development: A Cross National Study of Less Developed Countries. *Journal of Social Sciences and Medicine*, 45(2), 305-317.