

# Health Expenditure Distribution and Life Expectancy in Nigeria

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**Abstract-** Improvement in health service delivery is a necessary condition for the enhancement in Human Capital Development and high level of life expectancy. However, this is very hard to achieve especially in developing countries. Therefore, this study examined the relationship between life expectancy and Government Expenditure in Nigeria between 1980 and 2015. The data for the study were sourced from Central Bank of Nigeria and Bureau of Statistics Annual Reports. Vector Autoregressive Distributive Model (VAR) was used as estimation technique. Results from forecast Error Variance Decomposition showed that the highest shocks to the life expectancy were accounted for by the share of government expenditure. The second in rank was the number of physicians and carbon dioxide also contributed immensely to low life expectancy in Nigeria. From the results, the contribution of real growth rate of income was indirect and marginal. Other variables such as Death and Birth rate did not contribute significantly to the life expectancy in Nigeria during the study period. Based on these findings, it is recommended that for life expectancy to increase in Nigeria, the share of government expenditure on health should increase and that plantation of grasses and trees should be encouraged to reduce the effect of carbon dioxide.

**Index Terms-** Life Expectancy, government Expenditure, VAR and Nigeria.

## I. INTRODUCTION

It has been established in the literature that improvement in health service delivery is a necessary condition not only for enhancement in Human Capital Development but also for high life expectancy in every nation both in developed and developing countries. Better health condition improves or shift labour supply curve to the right, increase the level of production and advancement in the performance of macroeconomic variables. Moreover, the extent of share of government expenditure on health to some extent determines the ultimate level of human capital development which then metamorphosizes to a better skillful efficient productive investment in other sectors of the economy. Increase in budgetary allocation to social services is required in developing countries especially Nigeria. Weak and poor budgetary allocation to health sector and poor implementation of health policies have been identified as some of the reasons for high level of poverty, income inequality and low life expectancy, (World Bank 2008).

In Nigeria, despite the relative huge budgetary allocation for health sector, this has not really manifested in the health status of an average Nigerian. The health status of Nigerians is

consistently ranked low. Nigeria is ranked 74<sup>th</sup> out of 115 countries based on the performance of some selected health indicators. ( World Bank, 1999).

Nigeria over all health system performance was equally ranked 187<sup>th</sup> among the 191 member states by the World Health Organization (WHO) in 2006 (National Health Policy, (2008). The infant and child mortality rate in Nigeria are among the highest in the world.

Furthermore, the relationship between share of government expenditure on health and life expectancy is proportional. That is, an improvement or increases in the share of government expenditure on health sector, the increase in the life expectancy. However the average life expectancy for male in Nigeria is forty while that of female is fifty two. (World Bank, 2010).

Empirical findings show that low share of government expenditure on health sector has been discovered to be one of the major reasons for poverty, poor sanitary system, income inequality and low life expectancy.

In addition, as a result of high level of fluctuations in Nigerian government revenue because of oil price shocks, both the recurrent and capital expenditure have been greatly altered over the year. For instance, since 1982 to 1987, the total government expenditure in Nigeria on health sector reduced from 72.9m which was less than ten percent of total budget in 1982 to as low as 17.2m in 1987 which of course was less than five percent of the total budget. However, in 1990, there was a remarkable improvement in share of government expenditure to around 297m in 1991, a reduction was still recorded that dropped to around 137m, also reduced further to 33.72m in 1992. The figures increased steadily to 586.2, 1993, but in subsequent years, the figures reduced till the current fiscal year. It should be noted that the capital expenditure on health follows the same pattern with the recurrent expenditure.

Several studies have been conducted to establish the causal relationship between government expenditure and health both in developed and developing nations. Chris & Gruce (2005), Serdark (2015), Serup (2016). Bakare & Olubokun, (2011) and several others. However, majority of these studies only considered the relationship between the health and macroeconomic variables. Therefore, it is essential to consider the nexus between government expenditure and life expectancy especially in Nigeria.

The rest of the paper is structured as follows; this introductory section is followed by section that discusses conceptual issues and empirical literature. Section three presents theoretical underpinning, methods and materials. Section four centers on results and its interpretation while section five concludes the paper.

## II. CONCEPTUAL ISSUES

### Life Expectancy

This indicates the number of years a person can live before he dies, subject to mortality risk prevailing. This is particularly depends on some factors; for instance, good welfare, high standard of living and good health condition etc. In developing countries is averaged of 35 to 40 years, compared with 62 to 65 years in the developed world. By 2000s, the difference has fallen to 16years as life expectancy in the less developed countries increased to 56 years (a gain of 42%) while the industrial nations had increased to 72 years (an increase of 13%). Today, because of still relatively infant mortality rates, Africa has the lowest life expectancy, 53 years, while the most favorable region in western Europe, where life expectancy at birth now average about 77 years. Nevertheless, for many developing nations, infant mortality rates have reduced dramatically over the past few decades. Todaro, (2000).

**Government Expenditure:** This is known as government consumption, investment, and transfer payment in national accounting. The acquisition by governments of goods and services for current use that directly satisfy the individual or collective needs of the community. Therefore, this is classed as government final consumption expenditure. However, government acquisition of goods and services intend to create future benefits, such as infrastructure investment or research spending, is classed as government investment (government gross capital formation). These two types of government spending on final consumption and on gross capital formation, together constitute one of the major components of Gross Domestic Product Ulevelkwak, (2008) However, government spending can be financed by government borrowing, seignior age, or taxes, changes in government spending is a major component of fiscal policy use to stabilize the macroeconomic performance.

### Empirical Literature

The issue of government expenditure and life expectancy has been so contentious especially in Nigeria. Therefore, some of the previous studies on the topic are hereby presented.

Serdar, (2015) examined the relationship between government expenditure and economic growth in Turkey. The study employed a Feder-Ram Approach as estimation technique. Findings from the study showed that the relationship between Government Health Expenditure and Economic Growth was positive during the study period. That is, when government expenditure on health improves economic growth improves as well as Serap, (2016) studied the relationship between Health expenditure and economic growth in some selected developing countries. A modified version of the Granger (1969) Causality test proposed by Joda and Yammoto (1995) and Dolado and Luthkepoh (1996) was employed as estimation technique. Findings from the study revealed that income is one of the major factors in explaining the difference in healthcare expenditures among countries. This showed that an increases in income level, stimulates healthcare expenditures for some emerging market-economies. In a related study, Bakare and Olubokun (2011) studied Health care expenditure and economic growth in Nigeria. The study applied ordinary least square as estimation technique. Results revealed a significant and positive

relationship between health care expenditure and economic growth in Nigeria during the study period.

Bhargava et al, (2001) examined the effects of health indicators on economic growth rates in the period 1965 to 1990 in some selected developed and developing countries. Panel co-integration was used as estimation technique. Finding from the study showed a positive and statistically significant relationship between health and economic growth in those selected countries. Erdil&Yetkiner, (2009) examined the relationship between Gross Doestic Product and Health expenditure in some selected countries. Pooled panel ordinary least grange causality were employed as estimation techniques. The major causality that runs between health and GDP was bi-directional. That is, increase in health care expenditure improves economic performance and that better economic performance encourages improvement in health care of the selected countries during the study period.

Wang, (2011) investigated the international total health care expenditure data for thirty one nations from 1986 to 2007. Panel regression was used as estimation technique from the results, improvement in health care delivery increases the output growth of selected countries during the study periods.

Mchrara&Musui, (2011) studied the relationship between health expenditure and economic growth for a sample of thirteen Middle East and North Africa countries between 1995 and 2005. The study employed panel co-integration and error correction as estimation technique. Findings from the study revealed a bi-directional relationship between health care expenditure and macro economic performance in selected countries during the study periods.

Bardacc, E.B, (2004) studied the relationship between health expenditure and macro economic performance in some twenty one selected countries. Panel regression was used as estimation technique. Findings revealed that increase in government expenditure on health stimulate economic growth of selected twenty one countries during the study periods.

Gupta & Mitra (2004), investigated the relationship between increased in government expenditure and infant mortality rate. The study used ordinary least square as estimation technique. Findings showed that increase in government health expenditure reduces infant mortality in selected developing nations,

Summarily, from the above empirical literature reviewed majority of the studies were on the relationship between government health expenditure and economic growth. Many of these studies were carried out in advanced countries. Only one or two of them were really on government expenditure on health and mortality rate. Therefore, this study is out to investigate the relationship between government expenditure on health and life expectancy.

### Section Three:

This section deals with theoretical underpinning, methods and materials

### Sources of Data

Data for this study are secondary in nature, sourced from Central Bank of Nigeria, Statistical Bulletin and Bureau of Statistics annual reports.

### Model Specification

From the reviewed of empirical literature and in line with the theoretical framework, below model is being specified to examine the relationship between life expectancy and share of government expenditure in Nigeria. Since our main objective is to examine the relationship between government expenditure and life expectancy. Then, this paper uses the share of government expenditure on health both recurrent and capital expenditure, life expectancy, the real growth rate, the total number of physician, carbon dioxide emission, death and birth rates as variables of interest. The unrestricted VAR model of order P is presented in equation 1

$$Y_E = AY_E + \dots + APY_{1-p} + \beta_E + \epsilon_t$$

$Z_t$  ‡ constant  $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6 \& \alpha_7$

Where  $Y_E$  is the vector of endogenous variables  $Z_t$  is the vector of exogenous variables A and B are coefficient matrices. P is an unobservable zero-mean with noise process.  $\alpha_1$  to  $\alpha_7$  are the variables chosen from 1980 to 2015 for the VAR model.

The estimation technique for the study is VAR. this method permits us to study the relative in the changes of other variables. The circumvents the problem involved with the specification and estimation of structural simultaneous equations in another advantage of VAR model. This is because the VAR model considers all variables as endogenous. Our empirical analysis should involve three stages. First, unit root test for the variables, Granger causality test and finally forecast error variance decomposition.

#### Section Four

##### Empirical Analysis and Policy Results

This section deals with empirical results starting with the time series properties of the variables.

##### Unit root test for the variables

The analysis is based on time series data. Therefore, some specific methods are required for the analysis. It is conventional that the econometric estimation of a model based on time series data requires that the series be stationary, as non-stationary series usually results in mis-leading references. To overcome this, Engle and Granger, (1987) provide a standard technique to solve this. This is systematically requires testing the variables of interest for stationarity by running the regressions for all the series both at first difference and at levels. For this stationarity test, Augmented Dickey Fuller (1979) is used. The results of ADF tests are presented in table 4.1 in appendix.

From the unit root test results in table 4.1 in the appendix, not all the variables are stationary at level except MPHU, but became stationary at first difference.

Since the levels of stationarity of the variables of interest have been established through ADF unit root test, we can now proceed to establish the causality that runs between our target variables. That is between government expenditure on health and life expectancy.

##### Granger Causality Analysis

It is required to determine whether government expenditure on health plays an important role in the life expectancy in Nigeria. Therefore, the causality that runs between them should be established. From the Granger Causality test results through pairwise Granger causality test, government expenditure on health shows that at F-ratio of 4.031, the null hypothesis cannot be accepted. Therefore, government expenditure Granger causes life expectancy, real growth rate, child mortality, death rate and total number of physician but the non hypothesis of non-Granger causality between government expenditure and carbon dioxide emission is accepted.

This is because, from table 4.2, government expenditure on health did not Granger cause carbon dioxide. From this Granger causality test result, we can conclude that causality that runs between government expenditure on health and life expectancy is bi-directional. That is, government expenditure Granger causes life expectancy and life expectancy Granger causes government expenditure. The economic implication of this is that when there is an increase in the share of government expenditure on health, life expectancy increases and when life expectancy increases, labour productivity increases and this will eventually stimulates the government income through taxation. Increase in taxation brings more income for government to spend.

##### Forecast Error Variance Decomposition

The series of analysis in the VAR methodology is the forecast Error Variance Decomposition (FEVD). In this wise, we try to determine the percentage of variance in each endogeneous variable that is determined by the other variables. This justifies the amount of influence the endogeneous factors exert on each other. However, table 4.3 in the appendix shows the various results of forecast error variance decomposition.

The variance decomposition suggests that shocks to the government expenditure had the highest influence on life expectancy throughout the period of analysis. It increased steadily and significantly overtime. Government expenditure on health responsible for about six percent shocks to life expectancy in the first quarter increased steadily like that till tenth quarter when it was around twenty five percent. The economic implication of this is that major determinant of life expectancy in Nigeria was the share of government expenditure on health during the study period. This result is in line with the findings of World Health Organization in (2010) which reported that increased in the share of government expenditure on health stimulates the life expectancy not only in developed countries but also, in developing nations. Other variables that had influence on life expectancy are, the total number of medical personnel. The total number of physicians accounted for two percent variation in life expectancy in the first three quarters, increased to about ten percent in seventh quarter, thereafter, the contribution started to reduce. This might be as a result of constant industrial actions by medical personnel due to poor working conditions and non availability of modern health facilities.

Moreover, the empirical result showed that the government expenditure largely explains itself for the first five quarter period of the analysis, therefore, the explanatory power reduced. Specifically, the empirical result showed that life expectancy accounted for the largest variations to the government expenditure. For instance about two percent shocks to

government expenditure was as a results of variation in the life expectancy. This increased steadily to about ten percent in the fifth quarter and by tenth quarter, it accounted for about fifteen percent. The shocks from death and birth rate were not that high. For instance, the shocks from death rate to life expectancy was about one percent from first quarter till sixth quarter but increased to about four percent in the tenth quarter. As regards the shocks from birth rate to life expectancy. This contributed a significant influence for instance, right from first quarter which was around ten percent, this increased to about nineteen percent in the tenth quarter. The shocks from real growth rate responsible for almost fifteen percent variation in life expectancy from first quarter till seventh quarter but this increased to about twenty percent in the tenth quarter. The shocks from carbon dioxide emission accounted for five percent variation in life expectancy in the first five period and increased to around ten percent in the tenth quarter.

Furthermore, as regards the response of variables of interest to shocks emanating from share of government expenditure on health. The shocks from the share of government expenditure on life expectancy was positive and significant from the results. The dynamic responses of life expectancy are persistent but smaller in magnitude in the wake of a shock to share of government expenditure on health. After the share of government on health shock, the life expectancy increase above the steady state level through different channels. The first is increased in total number physician and real growth rate. Although, an increase in the share of government expenditure on health causes the growth rate to increase but both birth rate and carbon dioxide emission increase steadily. The reason for this might be because of an increase in the life expectancy, the level of output increases, increasing in the output level generates more income for individual and this now increases the reproductive power of workers. For carbon dioxide emission, because of increasing and the number of industries and environmental degradation also increases.

### POLICY IMPLICATION ON THE RESULTS

Based on the results from estimated models that are outline in the above sub-section four, the results are instructive and far reaching. Some policies from the results are drawn in the first place, forecast error decomposition results suggests that shocks to the life expectancy in all the ten quarters were accounted considerably for by the share of government expenditure on health. Nigeria as a developing nation, when government expenditure on health improves, the life expectancy increase and vice-versa.

However, this has serious implication on policy formulation and implementation. This shows that one of the major determinant of life expectancy in Nigeria is government expenditure.

Secondly, the results shows that the number of physician do not matter to life expectancy but the income, condition of service of these physicians and other issues such as modern health equipment which is to be determined by the share of government expenditure on health are part of major determinants of life expectancy.

The third aspect of the result is the indirect and marginal impact of real growth rate on life expectancy. The implication of

this is that the transmission mechanism of life expectancy is not actually the growth rate of output but the share of government expenditure on health.

### III. CONCLUSION AND POLICY RECOMMENDATION

This study examined the relationship between life expectancy and government expenditure on health in Nigeria between 1980 and 2015. In the study, some relevant concept were discussed. Also, empirical literature on the topic were presented. From the presentation of these empirical literature, the study was able to discover the existing gaps in the literature. Vector Autoregressive Distributive model was used as estimation technique. From the empirical result based on forecast error variance decomposition, the highest shocks to the life expectancy was accounted for by the share of government expenditure on health. Also, the growth rate of output contributed indirect and marginal input on life expectancy. Two variables were equally contributed significantly to the life expectancy in the study. The variables were, carbon dioxide emission and number of physician.

Based on these findings, it is recommended that for the Nigerian government to achieve high and sustainable life expectancy, the share of government expenditure on health should be increased. Also, to reduce the carbon dioxide emission, planting of trees and grasses should be strength then.

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**Appendix I.**

**Table 4.1: Unit Roots Test Results**

Variables	ADF Lag	ADF test Statistics	95% critical value for the ADF statistics	Remark
LE	1	-0.923121	-2.8801	Non-stationary
HEXP	1	-2.124624	-2.8799	Non-stationary
CHDM	1	-0.0812342	-2.8799	Non-stationary
DHRC	1	-0.0721421	-2.8799	Non-stationary
MPHY	1	-4.321462	-2.8799	Stationary
RCG	1	1.624562	-2.8799	Non-stationary
COZE	1	-0.342126	-2.8799	Non-stationary
LE	1	-6.021462	-2.8800	Stationary
HEXP	1	-7.245621	-2.8800	Stationary
CHDM	1	-5.423241	-2.8800	Stationary
DHRC	1	-5.624123	-2.8800	Stationary
MPHY	1	-6.434567	-2.8800	Stationary
RGR	1	-26.45621	-2.8800	Stationary
COZE	1	-5.221346	-2.8800	Stationary

Note: Dicky Fuller Regressions include an intercept and a linear trend.