Determinants of Public Health Care Expenditure in Nigeria: An Error Correction Mechanism Approach

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Abstract

Investment in human capital through health could bring about economic growth in Nigeria. Health enhances worker effectiveness and the productivity of an individual through increase in physical and mental capacities which are necessary for economic growth and development. Base on this paradigm, the Nigeria government has devoted huge budgetary allocation to the health sector but this huge heath expenditure fails to translate into better health status of Nigerian and meet World Health Organisation (WHO) recommended budgetary allocation to the health sector. This study empirically examines the determinants of public health expenditure in Nigeria. Using the error correction techniques and time series data from 1986 to 2010 to evaluate the factors that influence public health expenditure in Nigeria, the results show that demand for health in Nigeria is price inelastic. It also shows that that total population of 14 Years of Age and Younger and health expenditure share in gross domestic product (proxy for government developmental policy on health) are the major determinants of health expenditure in Nigeria while gross domestic product per capital, unemployment rate, Population per Physician, consumer price index and political instability are insignificant. To this end, the study recommends that government should put in place adequate spending on health at all level (primary, secondary and tertiary institution).Government Budgetary allocation to health sector should be increased to the prescribe of 15% of its annual budgetary allocation to the health sector. This will make government health expenditure to have a robust effect on Nigerians health status and meet WHO recommended budgetary allocation to the sector. The study also recommended that there is need for government to take cognisance of the growth population of Nigerian 14 Years of Age and Younger in health care expenditure and allocation and government should form synergy with the private sector in providing quality and quantitative health facilities to meet the demand of Nigerians in line with the Millennium Development Goal (MDGS).

Keywords: Health Status, Government Health Expenditure, Health Care, Health Sector.

Introduction

There is increasing empirical evidence that health matters for economic growth and development. Literature on economic growth has clearly showed the role of health in influencing economic performance, at least at the micro level. It is suggested that, all things being equals, healthier workers are more likely to be able to work longer, be generally more productive than their relatively less healthy counterparts, thus able to secure higher earnings than diseases ridden workers. Babatude (2012) posited that poor health infrastructure, illness and diseased shorting the working lives of people thereby reducing their life time earnings.

Schultz (1999) postulated that good health has positive impact on the learning ability of children which lead to better educational outcome, school completion rate, higher means of years schooling, achievement and increases the efficiency of human capital formation by individuals and households. Lawanson (2009) asserted that health is one of the major components of human capital formation. While Todaro (2007) reveals that human resources constitute the ultimate basic for the wealth of a nations, capital and natural resources are passive factors of production, human beings are the active agents who accumulate capital, exploit natural resources, build social economic and political organization and carry forwards national development.

Clarity, a country which is unable to develop the skills and knowledge of its people and to utilize them effectively in the national economy will be unable to develop any things else. Most countries strive to attract good health because of its acknowledged advantages as a basic component of economic growth and development. Africa-Nigeria in particular joined the rest of the world in seeking improvement in the health status of Nigerians as evidence by the kind of government policies intervention in the development of the health sector to enhance the nation economic output. In realization of this, successive Nigerian governments have being making serious effort in budgeting allocation to the health sector.

According to CBN (2010) the total government expenditure to health as at 1986, 1990, 2000 and 2010 was ₦360.4M, ₦558.1M, ₦18181.8M, and ₦149269.8M respectively. The capital expenditure also show same continuous increase in trend in 1986, 1990, 2000 and 2010 recorded ₦18.2M, ₦157.0, ₦6569.2M and ₦46649.8M respectively. Similarly, the recurrent expenditure also reveals continuous increase in value from 1986, 1990, 2000 and 2010 are ₦279.2M, ₦401.1M, ₦11612.60M and ₦102620M respectively.

However, Alabi, Adams, chime, Abu and Aiglomudu (2010) reveal that in Nigeria less than 1% of GDP was allocated to health care provision, and about 2% of government oil revenue was allocated to health sector in Nigeria between 1981 and 2006. The fact that this low financial commitment will result in inequality in access to health care resources and since majority of Nigerian are poor and pay for their health care out of their pocket money may be left of health care provision. Nigerian project Agenda (2007) has shown that accessibility to health care facilities in Nigeria is low. It was revealed that only 3 out of 5 Nigerians have access to health care facilities.

A critical look into the share of public expenditure on health in the national budget revealed that the share of health is rather low. The percentage of public health expenditure on total government expenditure according to world health organization in 1995, 2000, 2005, and 2010 was 7.05%, 4.22%, 6.41% and 4.4% respectively. This suggests that Nigerian health care situation still needs some improvement in budget allocation mostly in the area of planning and execution. As reported by Bakare and Sanmi (2011) that in spite of all these increases, much impact has not been made in the area of reduction of infants, under five and maternal mortalities since 1970. For instance, the Nigerian rate of infant mortality (91, per 1000 lives births) is among the highest in the world, and the immunization coverage has dropped below thirty percent while mortality rate for children under age five is 192 death per one thousand by year 2007, it was also reported that more than one hundred and thirty-four thousand (134000) women died from pregnancy complications. In addition, the life expectancy ratio on the average has been on the decline over the study period and the world bank 1999 ranked Nigerian 74th out of 115 countries based on the performance of some selected health indicators while the general health system performance was also by the 187th among the 191 member states by the world health organization while Ogunjuyigbe and Laisu (2010) reveals that Nigeria is one of the countries lagging behind in all the millennium development goals (MDG'S) to which 191 countries including Nigerian signed at the turned of the millennium in 2001.

With the above perception, it becomes worrisome to ask several questions such as what has been the structure and pattern of government health expenditure in Nigeria. What has been the trend of expenditure on health in Nigeria and finally what are the factors that determine the public health care expenditure in Nigeria. Against this background, this paper seeks to investigate the trends of health expenditure in Nigeria and what are the factor that determines public's health expenditure in Nigerian following this introduction, the remaining part of this study is structured as following section 2 will deal with the literature review while section 3 will examine the review of federal government health expenditure in Nigeria. Section 4 is the methodology of the study, section 5 is the empirical results and analysis and section 6 is the summary, conclusion and policy recommendations.

Review of Relatd Literature

The Keynesian macro-economic thought which is some time called the demand side of the economy postulate that public spending can contribute positively to economic growth. Hence an increase in government expenditure is likely to leads to the same proportionate increase in employment, profitability and investment through multiplier effect on aggregate demand. Base on this background government spending augument the aggregate demand, which provokes increases in output depending on expenditure multiplier (Saaded and kalakech, 2009).

However Barro and Sala-I-Martin (1992) classify public expenditure as productive and unproductive and hypothesized that productive expenditure such as expenditure on education, health, road, e.t.c have a direct influence on the rate of economic growth while unproductive expenditure such expenditure on salary, rent,e.t.c have indirect or no effect.

However, government spending on health play a crucial role in economic growth. Therefore, the healthier nature of population determined their ability to contribute to economic performance. Babatude (2012) asserted that better health enables better earning ability for both workers and enterprises which in turn enhance the tax based of the government leading to better fiscal posture. These interactions, all things being equals, will lead to better economic performance. Thus the manner in which growth is shared also influence the rate of poverty reduction.

Health is one of the significant factors that determine the quality of human capital which is a necessary factor for economic growth. Based on this paradigm developing countries have attempted to enhance the human capital through public health expenditure as well as government spending on education and other social services. Al-Yesufy (2000) and Lawson (2009) noted that education, health care, training and investment in social services enhances and improves the human capacity which has a spill over effect on economic growth.

Public health expenditure consist of recurrent and capital spending from government (federal, states and local government) budgets, external borrowings, and grants (including donations from international agencies and non-governmental organizations), and social (or compulsory) health insurance funds. While, total health expenditure is the sum of public and private health expenditure. It covers the provision of health service (preventive and curative) family planning activities, nutrition activities and emergency aid designated for health but does not include the provision of water and sanitation (WHO, 2010).

Graffian and Mckinley (1992) revealed that most developing countries suffer from poor expenditure on health care and the majority of public health care expenditure on hospital and expensive medical care that benefit a small minority of the population living in the cities. A high proportion of the poor is far from this service especially those living in rural areas. They usually rely on home remedies and traditional medicine.

There is a growing literature on the determinants of public health expenditure in cross countries and country specific. For examples Das and Martin (2010) quantitative examine the determinants of aggregate health care expenditure using a co-integration procedure. The evidence in the study supports co-integration. The results also indicate that per capita income contributes significantly to the explanation of the health care expenditure. Age of the population, the number of practicing doctors and the ratio of public health expenditure to total health care expenditure does not seem to have any big impact on aggregate health care expenditure in the U.S. The conclusions drawn from the results is that the health expenditure policy should be coupled not necessarily with the increase in the supply of physicians or policies that promote competition but, with long-run policies that promote human capital. They also find that the mixture of public-private funding does not contribute significantly to the explanation of the health care expenditure in the U.S. Khorassani and Paskawych (2009) also reported that the major determinants of per capita healthcare expenditures in U.S.A are age and income related. The proportion of the population 15 years old or younger seems to have the largest effect on per capita healthcare expenditures in the United States. They concluded that children are the ones highest in demand for healthcare. It also appears that the supply of healthcare in the United States is not a significant determining factor of healthcare expenditures.

Chaabouni and Abednnadher (2010) examine the determinants of health expenditures in Tunisia during the period 1961-2008, using the Autoregressive Distributed Lag (ARDL) approach by Pesaran et al. (2001). The results of the bounds test show that there is a stable long-run relationship between per capita health expenditure, GDP, population ageing, medical density and environmental quality. In fact, on the one hand there are the short-run and long-run results which reveal that health care is a necessity, not a luxury good. On the other hand, results of the causality test show that there is a bi-directional causal flow from health expenditures to income, both in the short and in the long run. They recommended that policies aiming at encouraging health expenses are required to build up a healthier and productive society to support the Tunisian's economic growth and development. In addition, the Ministry of Health should minimize the gap of inequality distribution of health care among people considering the spread of emerging chronic diseases and assuring the quality and performance of public health supply. Moreover, the external cooperation of the World Health Organization is also required to make an exchange of expertise and health care information.

Zheng, Yu. Zhang and Zhang (2010) investigate the effect of pollution on health care expenditure using a panel dataset consisting of 31 Chinese provinces covering the period 1997-2003. In particular, the study explores the non stationarity and co- integration properties between health care expenditure and environmental indicators.

This is done in a panel co-integration framework and in doing so; they examine both the long-run and the short-run impacts of per capita provincial GDP, waste and gas emissions, dust and smug emissions, and waste and water emissions on per capita public health expenditure. They concluded that, both in the long run or the short run, public health expenditure are not only positively affected by the province's economy, but also by environmental quality.

Olaniyan, Onisanwa and Oyinlola (2013) examine health care expenditures and GDP in sub-Saharan African countries: evidence from panel data. They postulated that Understanding the extent of the linkage between the share of health expenditure in GDP and change in standard of living is important for several reasons. First, it enables a proper accounting of the notable growth in the health care sector over the last half century. Secondly, it is necessary for forecasting how health care spending is likely to evolve in the coming years. Finally, it is a crucial step towards an assessment of the optimality of the growth of the health care sector. In particular, if health spending is strongly increasing in income, so that rising income can explain most or the entire rising health share, it would be more likely that the increasing share of GDP allocated to health is socially optimal. Their analysis indicates that health care expenditure and most of its determinants are non-stationary, and that they are linked in the long-run. The findings shows elasticity is below unity for Sub – Sahara Africa countries, it is significantly lower than 1, indicating that health care is a necessity good. The majority of the countries presents an income elasticity lower than one, confirming that health care is, overall, a necessity good in Sub-Sahara Africa. They noted that the 16 countries, display negative significant coefficients, while 16 other Countries(Burundi, Botswana, Cote d'ivoire, Cape Verde, Djibouti, Ghana, Guinea Bissau, Liberia, Malawi, Mozambique, Rwanda, Senegal, Togo, South Africa, Democratic Republic of Congo, Zambia) show statistically insignificant coefficients. One reason behind these results might be that there exist unobserved cross border movements of recipients that alter the relationship between health spending and income at country level.

Kamiya (2010) examines the determinant of health in 14 developing countries using GMM to estimate the determinants of under-five mortality rate with a cross country of 141 developing countries. The empirical results show that GDP per capital and access to improve sanitation have statistically significant in reducing child mortality while health factor which are measured by government health spending, immunization coverage and physician density do not significantly impacted on child morality reduction.

Abbas and Heimenz (2011) empirically examine the determinants of public health expenditure in Pakistan for the period which span between 1972 and 2006. Using co-integration and error correction methodology, the study reveals that health care in Pakistani is a necessity commodity. Urbanization and unemployment have negative effect on health care expenditure which implies that it is costly to provide health care to resident of remote rural area of Pakistan.

Rahman (2008) examine the determinants of health expenditure in some Indian states using a panel data model the findings was that health expenditure in Indian is not a luxury good with the elasticity of 0.47. The study further reveals that state per capital income and literacy rate has significant factors that influence health expenditure while other structural demands variable such as proportion of state population over the age 60, population per primary health care centre and population per doctor was insignificant.

Tang (2010) investigated the determinant of health expenditure in Malaysia. Using time series frame work from 1967 to 2007 and employing econometric methodology the findings showed that health expenditure and its determinants are co-integrated which is in line with economic theory. The study further reveals that the major factor that influence health expenditure are income, health care prices and proportion of population aged more than 65 years of age and the causality indicates that health expenditure and income is bi-directional in nature and the policy import is that initiative to promote health expenditure should be implemented to achieve sustainable economic growth and development.

Agbatogun and Taiwo (2010) empirically examine the determinants of health expenditure in Nigeria. They show that improvement in health sector is sine-qua-non to sustainable economic growth and development. They found that gross domestic product is the most important determinants of health allocation and literacy rate and population's growth rate are insignificant determinant of health expenditure in Nigeria. They recommended that there is need for health sectors reformed in order to improve the health of the people and reduce the burden on the government by encouraging more private sector participation. Omotor (2009) also carried out same study in the Nigeria's economy for the period of 1970-2003 using co-integration analysis.

His main findings are that health expenditure in Nigeria is income inelastic and public financing for health expenditure appears to have more impact on health expenditure than other determinants including per capital income.

Reman, Bassey and Edu (2011) examine health care expenditure in Nigeria; does the level of government spending rely matter for the period which spanned between 1980 to 2003, employing cobb-douglas production and ordinary least squares method of analysis. They found that life expectancy and literacy rate were negatively correlated with health care expenditure both in the short and long run, income elasticity of health care expenditure was below unit both in the short and long run. Which show that health care spending is income inelastic and concluded that health is a necessary good in Nigeria. They recommended that in order to improve the health status of Nigerians, government needs to increase funding of health sector and reduce the inequality in the budgeting distribution of health expenditure.

Review of Federal Government Health Expenditure in Nigeria (1986 - 2010)

Table3.1. Value of public Health expenditure in Nigeria (1986 - 2010)

Year	Capital expenditure on Heath (₦, M) 1	Recurrent expenditure on Heath (₦, M) 2	Total expenditure on Heath (₦, M) 3	Total government expenditure (₦, M) 4	% of 1on 3	% of 2 on 3	% of 3 on 4
1986	81.2	279.2	360.4	16223.7	22.5	77.5	2.2
1987	69.5	133.9	236.4	22018.7	29.4	70.6	1.1
1988	183.2	260.0	443.2	27749.5	41.3	58.7	1.6
1989	126.0	326.6	452.6	41028.3	27.8	72.2	1.1
1990	157.0	401.1	558.1	60268.2	28.1	71.9	0.9
1991	136.6	619.4	756	66584.4	18.1	81.9	1.1
1992	188.0	837.4	1025.4	92797.4	18.3	81.7	1.1
1993	352.9	2331.60	2684.5	191228.9	13.1	86.9	1.4
1994	961	2066.8	3027.8	160893.2	31.7	68.3	1.9
1995	1125.2	3335.7	5060.9	248768.1	34.1	65.9	2.0
1996	1659.5	3192.0	4851.5	337217.6	34.2	65.8	1.4
1997	2623.8	3179.2	5803	428215.2	45.2	54.8	1.4
1998	7123.8	4860.5	11984.3	487113.4	49.4	40.6	2.5
1999	7386.8	8793.2	16180.0	947690.0	45.7	54.3	1.7
2000	6569.2	11612.6	18181.8	701059.4	36.1	63.9	2.6
2001	20128	24523.5	44651.5	1018025.6	45.1	54.9	4.4
2002	12608.0	50563.2	63171.2	1018155.8	20	80.0	6.2
2003	6431	33254.5	39685.5	1225965.9	16.2	83.8	3.2
2004	26410	33377.4	59787.4	1822100.00	44.2	55.8	4.2
2005	21652.6	50032.8	71686.4	1822100.00	30.2	69.8	3.9
2006	38039.8	67550.2	105590	1938002.5	36.0	64.0	5.4
2007	34728.8	81900	116628.8	2450896.7	29.8	70.2	4.8
2008	38702.5	98200	136902.5	3240820.0	28.3	71.2	4.2
2009	42676.2	90200	132876.2	3452990.8	32.1	67.9	3.8
2010	46649.8	102620	149269.8	41941217.9	31.3	68.7	3.6

Source: CBN statistical bulletin (2010)

Both recurrent and capital budget in health sector are needed to sustain the sector in mobilization of human and material resources so as to advance the course of human capital development. The World Bank recommended that 15% of government budgetary allocation be assigned to the health sector. In Nigeria, this has not been achieved by the government, thereby affecting government programmes and policies for the development of the sector. For the year under review the average budgetary allocation to the health sector was 2.7% which is far less than what WHO recommended.

There is an uneven distribution of finance in the health sector going by the data as shown in table 3.1, where the percentage of expenditure on health is derived from aggregate government expenditure. The table shown that the recurrent expenditure dominate the expenditure pattern of government total expenditure on health through the period of analysis with average value of 68.07% while the highest value and the least value are 86.9% and 40.6% in 1993 and 1998 respectively. The capital expenditure share in total government on health average 31.41% with the highest value of 49.4% in 1998 while the least was 13.1% in 1993.

Going by the analysis so far, there have appear to have been a shift from the provision of funding to procured capital health facilities to that of recruitment of personnel and payment of salaries and wages. One wonders whether such personnel can operate in the absence of the require infrastructure and equipment and facilities that are quite needed to develop the right health facilities which will have both forward and backward spill over effect on Nigeria's economic growth.

Methods of the Study

Theoretical Framework and Model Specification

The literature identifies four alternative approaches to determining general expenditure; cost accounting, demand-side argument, supply side factors, and development theory (Ayanwu, 1998). The cost accounting approach involves government programmes, including health, education, and social security and separates the effects of demographic influence, changes in coverage and increases in real benefits (Sanders and Klau, 1984).

According to Anyanwu (1998), the demand- side approach includes Wagner's Law, preference –based explanations and public choice theories. First, it is argued that price or unit cost of government output affects growth on government spending. Secondly, Wagner Law postulated that there are inherent tendencies between growths of economic and government activities with the result that governmental sector grows faster than the economy. This implies that as income rises, the demand for government increases more than in proportion, primary because of the technological requirements of industrialization and the urbanization that accompanied it, that is the income effects.

Thirdly, it is opined that prevailing ideologies or other political economy explanations that reflect different attitude about the role of government, and hence different "tastes" account for some variance in government spending. The public choice school embraces a number of demand oriented model of government expenditure growth, including theories of bureaucracy and median voter and public employees voting models. However, Anyanwu (1998) asserts that public voting models fail to apply in nationals without demographic institutions.

Supply-side model predicts that increase in the unit cost of public production is an important determinant of the growth in government expenditure. The other supply-side argument reflects 'Says law of government spending": public expenditure is driven by the availability of revenue (see also peacock and wise man, 1963). This is analogous to the "Please effect'": public expenditure, especially for consumption, is driven by available resources (Please, 1967).

Development theories explain growth of government expenditure in developing countries in terms of the fact that government spending accounts for higher shares of national income than it did when the now industrial economics were at comparable level of per capital income (Ayanwu, 1998). Thus, it is opined that multilateral and bilateral aid with their requirement for public sector rather than private sector counterparts, and the demonstration effects of successful capitalist and socialist countries with large and growing states sectors, affects government expenditure in developing countries.

However, in the specific case of health expenditure, three groups of independent variables are usually important: health stock variables, demographic variable and economic variables (Newhouse, 1977; Karatzas, 1992, Anyanwu, 1998 and Abbas and Hiemenz, 2011). Anyanwu (1998) noted that the health stock variables explain the supply factors while the demographic and economic variables emphasize demand for health expenditure.

Based on previous studies (Histiris and Posuet 1992, Hausen and King, 1996, Ayanwu, 1998; Abbas and Heimez, 2011) with modification, the determinants of public health expenditure given the budget constraints can be expressed as a function of the health stock, demographic, economic and political variables.

The above hypothesis gives rise to the following empirical specification of real health expenditure regression equation in log-linear form

$$InTHE = \alpha_0 + \alpha_1 GDPPC + \alpha_2 POI + \alpha_3 PHR + \alpha_4 HSGDP + \alpha_5 UN + \alpha_6 PP + \alpha_7 CPI + U_t \quad --(1)$$

Where

THE	=	Total health expenditure
GDPPC	=	Gross domestic product per capital
TPY	=	Total Population 14 Years of Age and Younger
HSGDP	=	Health expenditure share in gross domestic product (proxy for government developmental policy on health)
UN	=	Unemployment rate
PPH	=	Population per Physician
CPI	=	Consumer price index (proxy for health care prices)
POI	=	Political instability
U_t	=	Error Term

Sources of Data

This research work will rely on secondary sources of data. The annual time series data from 1986 to 2010 used in this study were obtained from Statistical Bulletin and Annual Report and Statement of Accounts of the Central Bank of Nigeria, World Health Organisation Publications as well as the Annual Abstracts of statistics (various issues) published by the National Bureau of Statistics (NBS).

Method of Data Analysis:

The method of data analysis employed in this study is both descriptive and analytical. The descriptive tools include the use of graphs, tables and percentages. The analytical tool used the contemporary co-integration test in the analysis of data. This is premised on the fact that if the variable are non-stationary, the desirable properties of efficiency, consistency and un-biasedness will be lost if Ordinary Least Square (OLS) regression techniques used in the estimation of the equation. The estimation procedure adopted in this study is in three sequences.

1) The time series properties of the data employed in the study is first carried out to determine if they are stationary. Most time series data are non-stationary and using non stationary variable in the model might lead to spurious regression (Granger and Newbold, 1974). To stem the problem of spurious regression, it is important that the time series properties of the data set employed in estimation of equation 1 is ascertained. The general model used in testing the presence of a unit root is specified thus:

$$\Delta y_t = \alpha_0 + \delta y_{t-1} + \sum_{t=1}^{P} \alpha_1 \Delta y_{t-1} + \varepsilon_t \quad ------------------------(2)$$

Where y is the series t is (trend factor): $\square_0$ is the constant term, e_t is the Gussian white noise and β is the lag length. The Augumented Dickey – Fuller (ADF) unit root test is employed to test the integration level.

2) The second step is the testing of presence or otherwise of co-integration between the series of the some order of integration through forming a co-integration equation. Aremu (2009) asserts that the fundamental assumption when experimenting with co-integration is that the variable is integrated of the same order. The set of variable X_t is said to be co integrated if a linear combination of the variable will result in stationary process i.e. 1(0). For a regression relation to be robust and meaningful the various series must be co-integrated; if otherwise, the equation retains its unit's roots properties and hence misleading regression. In this study the approach adopted is the maximum likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991). The Johansen's technique is chosen because it is vector auto regression based and there are clear evidence that it performs better than single equation and alternative multivariate method (Olusanyu and Oyaromade, 2009). Specifically, if Y_t is a vector of n stochastic variables, then there exist a P-lay vector auto regression with Gaussian error of the following form:

Johasen's methodology takes its starting point in the vector auto regression (VAR) of order P given by

$$Y_t = \mu + \Delta_1 y_{t-1} + ---------+ \Delta PY_{t-P} + \Sigma_+ -------------(3)$$

Where

y_t is an n x 1 vector of variables that are integrated of order commonly denoted (1) and $\sum_t$ is an n x 1 vector of innovation.

This VAR can be re-written as

$$\Delta y_t = u + n y_{t-1} + \sum_{1-1}^{p-1} r_1 \Delta y_{t-i} + \sum_t --------------------------(4)$$

Where $\pi = \sum_{1-1}^{p} A_{1-1}$ and $T_i = -\sum_{j=i+1}^{p} Aj$

To determine the number of co-integration vectors Johansen (1988, 1989) and Johansen and Juselius (1990) suggested two statistic tests, the first test is the trace test (λ trace). It test the null hypothesis that the number of distinct co-integrating vector is less than or equal to q against a general unrestricted alternative q=r. the test calculated. Thus:

$$\lambda \text{ trace } (r) = -T \sum_{i=r+1} in\left(1 - \hat{\lambda}_t\right) --------------------(5)$$

T is the number of usable observations, and λ_1, s are the estimate eigen value from the matrix.

The second statistical test is the maximum eigen value test (λ max) that is calculated according to the following formula:

$$\lambda \text{ Max } (r, r+1) = -T \text{ in } (1 - \lambda r + 1) ----------------------- (6)$$

The test deals with a test of the null hypothesis that there is r of co-interacting vector against the alternative that r + 1 co integration vector.

3. If co-integration is proven to exist the next step require the construct of error correction mechanism (ECM) to model dynamic relationship short run dynamic with long run equilibrium. The ECM incorporated the (short-run) dynamic of the model:

$$Y_t = a \beta_{yt} + \sum_t -- (7)$$

Therefore

$$\Delta yt = U_{t-i} + \sum_{i=1}^{p} \beta \Delta x_{t-1} + \sum_{i=1}^{p} \propto_{i\Delta} y_{t-1} + \sum_t ---------------(8)$$

Here, U_{t-1} is the one period lagged valued of the error from co-integrating regression while Δ denote the first differences operator and $\sum_t$ is white-noise means and constant variance.

Empirical   Results and Analysis

Time Series Properties of Data Series

In line with the steps outline in section 4, we subject all the variables in the model to stationarity test. The convention method of Augmented Dickey Fuller (ADF) test was employed in this study. The results of this test are reported in table 5.1

Table 5.1: Augmented Dickey Fuller (ADF) Test for Stationary

Variables	At level	1st difference	Order of integration
THE	-0.704	-6.528	1(1)
GDPPC	-2.392	-4.076	1(1)
TPY	-1.190	-5.042	1(1)
HSGDP	-1.337	-6.7545	1(1)
UN	-1.121	-5.994	1(1)
PPH	-0.184	5.042	1(1)
CPI	-2.803	-3.805	1(1)
POI	-1.612	-4.796	1(1)

Source: Computed by the authors

The ADF tests are run against the null hypothesis that there is unit root 1(1) non-stationarity of the series. With a sample size of 25, the critical value ADF at 5% significant level is -2.991. Absolute value of ADF less than the critical value indicate a rejection of the null hypothesis. The result of the test as reported in table 5.1 depict that the entire variables are stationary at their first difference.

Co-integration Test

Since the unit root test shows that the entire variables are stationary at their first other difference 1(1), we therefore test for co-integration among these variables by using the reduced rank procedure developed by (Johansson 1988; Juselius 1990).

Johansson method detects a number of co-integration vectors in non-stationary time series. It allows, for hypothesis testing regarding the element of co-integrating vector and loading matrix. This procedure is used to determine the long run relationship between the variables.
The result of Johasen co-integration test is shown in table 5.2 below.

Table 5.1. Johansen co-integration Test

Eigen Values	Likelihood ratio	5% percentage Critical value	1% Percent Critical Value	Hypothesized no of CE (s)
0.972920	191.8781	124.24	133.57	None**
0.898917	105.2634	94.15	103.18	At most 1 **
0.632399	50.25995	68.52	76.07	At most 2
0.496958	26.24178	47.21	54.46	At most 3
0.203465	9.751801	29.68	35.65	At most 4
0.157888	4.292181	15.41	20.04	At most 5
0.006975	0.167978	3.76	6.65	At most 6

* (**) denotes rejection of hypothesis at 5% (1%) significant.
L.R test indicates 2 co-integrating equation (s) at 5% significant.

Source: Computed by the authors

The result shows that there exist two (2) co-integrating equation at 5% level of significance. This is because the likelihood ratio is greater than the critical value at 5%. This shows that there is long run relationship between total government health expenditure and all the explanatory variables.

Parsimonious Error Correlation for the determinants of government health expenditure in Nigeria.

Over-parametised effect of investment in education on economic growth models which incorporates the lagged changed of the models variables is constructed. This is then simplified until theory consistent and data coherent results are achieved by gradually deleting insignificant variables. The results of parsimonious model are presented in table 5.3 below.

Table 5.3: Parsimonious Error Correction for Determinants of Government Health Expenditure in Nigeria Modelling DLOGTHE by OLS.

Variable	Coefficient	Std Error	t-statistic	Probability
C	0.044	0.031	1.393	0.184
D(LOG(GDPPC))	0.050	0.660	0.451	0.658
DLOG(TPY-2)	0.296	5.663	2.792	0.014
DLOG(HSGDP)	-0.654	0.103	-6.175	0.000
DLOG(UN)	-0.088	0.102	0.751	0.464
DLOG(PPH)	0.021	0.530	0.210	0.836
DLOG(CPI)	0.228	0.240	2.054	0.580
DPOI	0.121	0.045	1.113	0.283
ECM(-1)	-0.402	0.258	-4.289	0.001

R^2= 0.894; R^{-2} = 0.837; F = 15.798; D.W = 2.238

Source: computed by the authors

The parsimonious model result above shows that the coefficient of the error correction term (ECM) is negative and the same time significant with a very low probability value of 0.001. Its value in absolute term is about 0.402 indicating that about 40%percent of the disequilibrium in the total government health expenditure in the previous year is corrected in the period. This is also appears significant demonstrating the fact that dependent and explanatory variables go a long way in explaining government total health expenditure in Nigeria.

In the result, there exists positive but insignificant relationship between gross domestic product per capita and total government health expenditure in Nigeria. This is consistent with the apriori expectation. This implies that one percent increase in gross domestic product per capita will lead to 0.050 percent increase in total government health expenditure. The coefficient value is not significant at 5% significance level which is confirmed by the very high probability value of 0.660. The implication of this study is that the elasticity of less than one of the variable indicates that health care expenditure in Nigeria is a normal good. The low value of the variable is a pointer to the fact that income in Nigeria is not equitably distributed and the government lack the political will to prioritize the health care sector. This findings is consistent with Omotor (2009), Reman, Bassey and Edu (2011) and Abbas and Hiemenz (2011) in their studies of determinants of health expenditure. They noted that health care expenditure is a normal good. But this is inconstant with Ayanwu (1998) who noted that health care expenditure is a luxury good. The discrepancy in findings may be attributed to various health policies put in place by government to enhance the growth and development of this sector.

From table 5.3, it could be observed that the percentage of total Population of 14 Years of Age and Younger has positive and significant effect on government health care expenditure. This in line with the apriori expectation, this shows that an increase in Total Population of 14 Years of Age and Younger will lead to 0.296 percent increase in total government heath expenditure in Nigeria. The coefficient of Total Population of 14 Years of Age and Younger is also significant at 0.05 significance level with a very low probability value of 0.000.The implication of this result is that proportionate increase in the Total Population of 14 Years of Age and Younger will lead to high demand of public health expenditure in terms of provision of immunization and that this group of population are more vulnerable to diseases. This result conforms to Khorassani and Paskawych (2009) who reported that the proportion of the population 15 years old or younger have the largest effect on per capita healthcare expenditures in the United States. They concluded that children are the ones highest in demand for healthcare.

Health expenditure share in gross domestic product (proxy for government developmental policy on health sector) has negative and significant impact on government heath expenditure in Nigeria.   This finding indicates that there are some fundamental problems with the way in which health policies are formulated and implemented in the Nigerian health sector and is not consistent with the world health organisation policy. This conform the graphical illustration findings that the average health expenditure in Nigeria is less than 15% which is recommended by WHO. Abbas and Hiemenz (2011) asserted that the level of development of a country affects health care spending and public health.

The Unemployment rate has positive sign and is not consistent with the Apriori expectation of negative sign. The value of the coefficient is 0.088. This implies that one percent increase in Unemployment rate will leads to 0.088 percent increase in government health expenditure. The coefficient is however not significant at 0.05 significance level. The positive and non-significance of this variable is attributed to the negative effect of employing few people in productive jobs and thereby reducing national income as well as individual income. These findings also reveal that unemployment lead to increase in provision of public demand of health facilities in Nigeria.

The Population per Physician variable coefficient bears a positive sign. These conform to the apriori expectation. This implies that there is direct relationship between Population per Physician and total government health expenditure in Nigeria. The value of the coefficient of PPH is 0.021. This implies that one percent increase in Population per Physician will lead to 0.021percent increase in government health expenditure. This variable is not statically significant at 0.05 levels. This finding is a pointer to the fact that the Nigerian health sector are characterised by inadequate number of professional doctors and which will lead to low capacity buildings and reduce human capacity utilisation which will lead to reduction in economic growth. This findings is consistent with Kamiya (2010) findings that population of physician has no significant impact on health expenditure in the sub Saharan Africa countries.

The coefficient of Consumer price index is 0.228. This implies that a one percent increase in Consumer price index will leads to 0.228 percent increase in total government health expenditure. This variable was found to be not statistically significant at 0.05 percent level of significant judging from the pro-value estimate of 0.530. The positive nature of Consumer price index indicates that cost of health care does not discourage Nigerians for the demand of health resources. This confirmed to the findings of Havemann and Vander Berg (2002) in South Africa that the amounts charge in hospital is not statistically significant in demand for health care services. This is conforming to the theoretical view and empirical findings that health care demand is reasonably price inelastic. Ailemen, Asokhia and Okojie (2011) postulated that the reason is that most people can borrow to obtained health care services.

The estimated coefficient of Political instability (POI) was found to be 0.121. Thus, a direct relationship with total government health expenditure and political instability was established. This is not consistent with the apriori exploitation. The variable is not significant at 5 percents levels of significance. This result indicates that high level of political instability discourage growth of total government health expenditure in Nigeria. Ayanwu (1998) noted that civilian government allocate more real funds to the health sector than their military counterparts. The implication is that the more Nigeria has a democratic regime the better for the health sector financial resources.

The overall goodness of the model as shown by the adjusted coefficient of determination (R^{-2}) is 0.837, which shows that about 84 percent of the variation experience in total government health expenditure of Nigeria for the period being investigated may be explained by the independence variables included in our model.

The F-static which measure the joint statistical influence of the explanatory variable in explaining the dependent variables was found to be statistically significant at 5 percent significance level. The F-statistic figure of 15.789 shows that the explanatory variables are important determinants of Nigeria total government health expenditure.

The value of Durbin Watson (DW) statistic is 2.238 for the model. This implies that there are absences of auto-correction among the explanatory variables in the model.

Summary, Conclusion and Policy Implication

This study empirically x-rays the determinants of public health expenditure in Nigeria between 1986 and 2010. The study was conducted to identify those factors that can promote health expenditure in Nigeria. In order to achieve the aims of the study, an econometric model was formulated. Total government health expenditure was regressed on Gross domestic product per capital, total Population 14 Years of Age and Younger, health expenditure share in gross domestic product (proxy for government developmental policy on health sector), unemployment rate, Population per Physician, consumer price index (proxy for health care prices) and Political instability. These variables were included in our econometric model based on review of past studies.

The study use error correction mechanism to estimate the total government health expenditure and all independent variables after conducting stationarity and co-integration test. The result shown that all variables included in the model are stationary in the first order difference 1(1). Also the co-integration test showed presence of long-run relationship between dependent and explanatory variables in the model. The major findings of the study are summarized as follows.

There exists a positive but insignificant relationship between gross domestic product per capita and total government health expenditure in Nigeria. The implication of this study is that the elasticity of less than one of the variable indicates that health care expenditure in Nigeria is a normal good. The low value of the variable is a point to the fact that that income in Nigeria is not equitably distributed and the government lack the political will to prioritize the health care sector. This finding is consistent with Abbas and Hiemenz (2011) in Pakistan.

The result also shows that the percentage of total Population of 14 Years of Age and Younger has positive and significant effect on government health care expenditure. The implication of this result is that proportionate increase in the Total Population of 14 Years of Age and Younger will lead to high demand of public health expenditure in terms of provision of immunization and that this group of population are more vulnerable to diseases.

Health expenditure share in gross domestic product (proxy for government developmental policy on health sector) has negative and significant impact government heath expenditure in Nigeria.

This result indicates that there are some fundamental problems with the way in which health policies are formulated and implemented in the Nigerian health sector and these has not induce the growth and development of the sector.

The Unemployment rate has positive and insignificant impact on total government health expenditure and this is not consistent with the Apriori expectation of negative sign. This finding reveals that unemployment lead to increase in provision of public demand of health facilities in Nigeria.

The result also shows that Population per Physician has direct but insignificant effect on total government health expenditure in Nigeria. This result indicates that the Nigerian health sector are characterised by inadequate number of professional doctors.

Consumer price index proxy for cost of health has direct and insignificant impact on Nigeria total government health expenditure. This variable was found to be not statistically significant at 0.05 percent level of significant judging from the pro-value estimate of 0.530. The positive nature of Consumer price index indicates that cost of health care does not discourage Nigerians for the demand of health resources. This confirmed to the findings of Havemann and Vander Berg (2002) in South Africa that the amounts charge in hospital is not statistically significant in demand for health care services.

The result shows that Political instability has direct relationship with total government health expenditure. This is not consistent with the apriori exploitation. The variable is not significant at 5 percents level of significance. This result indicates that high level of political instability discourage growth of total government health expenditure in Nigeria. The implication is that the more Nigeria has a democratic regime the better for the health sector financial resources.

Conclusion

Investment in human capital through health could bring about economic growth in Nigeria. Health enhances worker effectiveness and the productivity of an individual through increase in physical and mental capacities which are necessary for economic growth and development. Base on this paradigm, the Nigeria government has devoted huge budgetary allocation to the health sector but this huge health expenditure fails to translate into healthier health status of Nigerians and meet World Health Organisation recommended budgetary allocation to the health sector. Base on this, the study examines the factors that determine health expenditure in Nigeria.

Conclusively, the general lesson that emerges from the study is that total population 14 Years of Age and Younger and health expenditure share in gross domestic product (proxy for government developmental policy on health) are the major determinants of health expenditure in Nigeria and that health demand in Nigeria is a normal good.

Policy Implications

Based on findings of this study the following policy recommendations are put forward:

There is need for increase in government spending on health at all levels (primary, secondary and tertiary institution).Government Budgetary allocation to health sector should be increased to the prescribe of 15% of its annual budgetary allocation to the health sector. This will make government health expenditure to have a robust effect on Nigerian health status and meet WHO recommended budgetary allocation to the sector.

There is also the need for investment in health and nutrition. Adequate investment in the sector will improve educational outcome and induce the nation economic growth. It is also necessary that Government health policies that support provision of facilities are induced in the country.

There is need for government to take cognisance of the growth population of Nigerian 14 Years of Age and Younger in health care expenditure and allocation policies since this group are the major determents of health expenditure in Nigeria.

Government would need to form synergy with the private sector in providing quality and quantitative health facility to meet the demand of Nigerians in line with the Millennium Development Goal (MDGS).

There is need for proper implementation and monitoring of our national health policy such as national health insurance scheme (NHIS). This will improve the health status and reduced health burden on household and the government.

The external cooperation of the World Health Organization is required to make an exchange of expertise and health care information, and train and retraining of Nigerian doctors. This will enhance population of professional doctors in Nigeria since they are inadequate per population.

Finally, adequate Machinery should be put in place by all sectors of government to arrest corruption and penalize those who divert and embezzle public health fund. This will enhance the mobilization of resources to furnish primary, secondary and tertiary health institutions and this will induced the Nation economic growth.

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