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DETERMINANTS OF PUBLIC HEALTH EXPENDITURE AND ECONOMIC GROWTH IN NIGERIA

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ABSTRACT
This study examines the Trend analysis of public Health Expenditure and Economic growth in Nigeria using time series data for the period 1970-2013. The study was anchored on the Grossman Health Capital Model and Endogenous Growth model with demand for health as investment. The study employed the Augmented Dickey Fuller and Philips-Perron tests, Johansen and Juselius Multivariate Cointegration approach, Granger Causality test and Error Correction Model techniques. The result of the Granger causality test revealed that a unidirectional causality existed between health expenditure and economic growth running from economic growth to recurrent, capital and total health expenditures. Also, the cointegration test showed that there is a positive and long run relationship among health expenditure, gross capital formation, adult literacy rate, life expectancy and economic growth in Nigeria, and a negative relationship existed among under-five mortality, infant mortality and economic growth. The regression results further showed that gross capital formation, adult literacy rate, capital and total health expenditures were statistically significant in influencing economic growth within the study period. While infant mortality and under-five mortality notwithstanding their negative signs were statistically significant in influencing economic growth in Nigeria. Following from the result, the study recommended that government should raise the quality of labour force in Nigeria through training and re-training. Also, government should increase its funding of the health sector especially the capital infrastructures. Finally, government should carryout frequent routine immunization exercise to prevent child killer diseases.

KEYWORDS: Health Expenditure, Maternal Anemia, Economic growth, Grossman Health Capital Model, infant mortality

1. INTRODUCTION

The place of health in growth and development of a nation cannot be over looked. The importance of health in development has been in the front burner in world discourse and has also influenced several development policies like the Millennium Development Goals (MDGs) with 37.5% of the goals dwelling on enhancing health and the remaining 62.5% of the goals are health enhancing goals. In demonstrating the importance of health in the development of a nation, World Bank sees health as a situation where the body is sound physically, mentally, spiritually and socially in good condition and not necessarily without disease and sickness. It is viewed as fundamental to national progress in any sphere. In terms of economic development, no other factor can be considered prominent than the health of the people. Health contributes to the progress of a nation's economy in four ways: firstly, health reduces production losses caused as a result of worker sickness; secondly, health allows man put to use God's endowment that has been left unused or untapped due to diseases; thirdly, health can increase children school enrollment and provides healthy learning environment and fourthly, health frees the use of resources for production activities that could have been expended on treating sickness (Denwoha, 2015 & World Bank, 1993).

Daggupta (1997) explained that the mortality of a mother while giving birth has strong impact on the chances of the infant and child's survival which takes into cognizance the long run impacts on the baby's education and health. This manifest into lower standard in prospective human capital production and economic progress. Furthermore, higher spending in health has the capacity to provide the population with qualitative living due to the provision of better medical care and facilities, which in turn improves performance and increase productivity of the workers.

While, Fogel (1997) stated that economic progress has the capacity to enhance health condition of the citizens in two ways: one, economic progress means growth in per capita income, some aspect of this revenue is spent in the consumption

of greater quality of and quantity of good food with better nutrient content which in turn improve health. Two, it is technological progress that leads to economic progress, this leads to improvement in all aspect of science (Medical Science inclusive). This means that if government invest more of this rising per capita income into the provision of more health for its citizens, there is the possibility that there will be an expansion in economic activities which will in turn led to economic progress.

Other supporters of public health expenditure believed that it is an intervention mechanism to reduce poverty since the downtrodden will not be able to pay the higher cost charged by private health providers, it also leads to increase in labour supply and productivity. Also, the influence of this on individual's lifetime earnings and good health, reduces the effects of poverty, and ultimately causing economic progress and development. It also takes the individuals out of catastrophic health financing as it reduces their out-of-pocket expenditure (see Eneji, Dickson, Onabe 2013, Anyanwu and Erhijakpor, 2007, Sahn, 2009 and Aranda 2010). This goes to demonstrate the importance of health in the progress and development of nations, as increase in health expenditure reduces poverty and improve the living standards of citizens.

Therefore, the importance and contribution of health to economic growth calls for concerted efforts by both public and private sectors respectively to increase the level of health expenditure, in improving quality service delivery of health care in Nigeria and achieving the core three health goals in the MDGs by 2015. But this is conditioned on the availability of resources which are scarce in Nigeria due to other competing human development indicators.

Edame (2025) has indicted that finance is the life wire of any organization and the place of finance in the provision of basic necessities of life especially health by government cannot be over looked. There is need for government to spend financial resources so as to bring efficiency to the health sector and attain to the health wants of the entire populace. However, it is not the situation in developing countries where spending on health is very low, (Arthur, 2013).

However, in modern times, Nigeria government has intervened by allocating resources to health intervention programmes like childhood immunization, HIV/AIDS anti-retroviral drugs, maternal mortality, antenatal education and programmes, post natal programmes, tuberculosis, malaria, and of recent Ebola Virus Diseases (EVD), etc, in order to improve on the health of its citizens. Consequently, government has increased budgetary provision of the health sector within the period under investigation. For instance, government capital expenditure on health in 1970 was N7.3 million, it increased to N188.1 million in 1980. This figure rose from N322.5 million in 1990 to N20,128.0 million in 2001. It increased to N45.0 billion in 2012, but reduced to N43.0 billion in 2013. On the other hand, government recurrent spending on health also witnessed some boost. This increased from N12.48million in 1970 to N279.2million in 1986. This figure was reduced drastically in 1987 to N166.9 million. It rose again to N260.0million in 1988. In 2000 it is N11,612.6 million and by 2009 it increased to N90,202.6 million. It increased from N99,119.92 in 2010 to N231,803.4million in 2011, but dropped to N197,900.00million in 2012. It increased again to N273,655.59 million in 2013 (CBN Statement of Accounts and Annual Reports various issues). On the other hand, Gross Domestic Product (GDP) has witnessed a continuous increase during the period investigated. The GDP in 1970 was N4,219.00 million it increased to N31,546.76 million in 1990, it rose further to N267,549.99 million, and N329,178.74million in 2000. In 2010, this figure increased to N776,332.21 billion and in 2013 it is N950,114.03 billion (CBN Statistical Bulletin, 2013).

Health expenditure by government major health indicators have been on the decline although in some cases there have been marginal improvements. For example, Life Expectancy at Birth (LEB) of 52years is less than world average of 71 years. The HIV/AIDs infected level total (% of population ages 15-49) was 3.3 percent in 2011 but reduced to 3.1 percent in 2012. Also, the Maternal Death Rate (MMR) per 100,000 live birth which is 560 is quiet high. Mortality rate under-5 (per 1,000 live births) of 124 is also high. Infant mortality rate (per 1,000 live birth) in Nigeria is 78, this high. The health spending, public (% of total health spending) for Nigeria of 31.1 percent is low. Also, out-of-pocket health spending (% of private spending on health) is 95.7 percent which is extremely high, health expenditure, total (% of GDP) 6.1 percent (World Development Indicators, 2012). The health expenditure, total (% of GDP) of Nigeria 6.1 percent in 2012 is still less than the world mean of 8-10 percent and Abuja declaration by African Heads of State of 15 percent.

On the other hand, infectious diseases that are treatable and preventable such as diarrhea, pneumonia, HIV/AIDS, malaria, and measles accounts for more than 70 percent of the assumed one million mortality of under-five infants in the Country. Furthermore, high profile individuals, especially the political class, top civil and public servants and their families frequently travel outside the country for medical treatment and better health care services due to poor functioning of the health institutions.

These unfortunate conditions does not show any justification on the huge resources the government has spent in the health sectors in terms of financing, policies and budgetary provisions within the study period. Against this backdrop, the basic questions this study seeks to provide answers to are;

1. What is the direction of causality between public health expenditure and economic growth in Nigeria?
2. Does public health expenditure impact on economic progress in Nigeria?

The major objective of this study is to investigate how public health spending influences economic progress in Nigeria. This work intends specifically to:

1. Investigate the direction of causality between public health spending and economic progress in Nigeria.
2. Examine influence of public health spending on economic progress in Nigeria.

2. Conceptual and Empirical Issues

The association between health and economic progress has for long been an issue of discourse by economists and researchers in both developed as well as developing countries, but more of these works are centered on the developed countries.

Ozturk and Topcu (2014), examined the association between health spending and economic progress within developed countries-G8 countries employing annual data from 1995 to 2012. The work employed the Augmented Dickey Fuller and

Vector Error Correction Model (VECM). However, panel cointegration results shows strong evidence that in the future health spending and economic progress have relationship. While the causality results showed a one way effect from health expenditure to economic progress in the short term; the direction of causality also run through economic progress to health spending in the long term.

Alhowaish, (2014) investigated the relationship and causal direction linking health care spending and economic progress for Saudi Arabia within 1981-2013 by employing Granger causality, Vector Autoregression methods, Philips- Perron test and Augmented Dickey Fuller test. Empirical findings indicated a one-way causal association from economic progress to health care spending in Saudi Arabia within the period investigated.

Musaba et al, (2013) worked on influence of Public Sectoral Spending on Economic progress in Malawi employing time series period from 1980 to 2007. They employed cointegration analysis within the Error Correction Model (ECM) technique. The result revealed absence of significant association between public sectoral expenditure and economic progress in the short term. Moreso, the result showed a long-term positive effect of expenditure on defence on economic progress and a negative effect of expenditure on education, health, social protection, transportation and communication on economic growth.

Inuwa and Haruna (2012), investigated Health Spending and Economic Progress nexus in Nigeria within the period 1980-2010 employing Auto Regression Distribution Lag (ARDL) bounding approach and Granger test. The outcome revealed long term association between public health expenditure and economic progress. Granger test indicates a strong bidirectional association between health spending and economic progress, however, it did not show the direction of the causality. They concluded that government as a matter of policy should include investment in health as a necessary tool of macroeconomic policy.

Supporting the above, Aurangzeb (2001) in his work on the association between health spending and economic progress in Pakistan over the period of 1973-2003. This was carried out using augmented Solow growth model, Johansen cointegration technique and Error Correction Model (ECM). This result revealed direct and significant association between Income and health spending in the now and in future.

In a similar study, Lustig (2006) in his work on the association existing between health and income in Mexico used annual data for the period 1970-1995, using death rates for different age groups and life expectancy as indicators of health, employed the Ordinary Least Squares (OLS) method. He observed that health determines a large variation on the long-term economic progress in the country. Reder(2010b) in studying the longitudinal adult learning in Portland, Oregon Metropolitan area using a Sample of 1000 high school dropouts from 1998-2007 and Test of Applied Literacy Skills (TALS). The result revealed that the development of literacy and essential skills during adulthood has huge economic benefits to individual adult and society in general.

Mayer (2001) worked on the influence of health on Economic progress of 18 Latin American countries, used annual data over the period 1950-1990. He used the Granger test for the work to estimate the cause and effect between health and income. This study observed that there exists a conditional Granger causality from health to income. All these studies lend credence to the view that a close and direct association exist between health spending and economic progress notwithstanding the country or region. Also, in a study Tang (2011) examined the association between health care spending and real income employing annual data from 1970-2009 of Malaysia. He used the Ordinary Square method. The result revealed that health care spending and real income are not cointegrated. This study also revealed the existence of two-ways causality between healthcare spending and real income for Malaysia.

Odior (2011), in his work on the association between public sector expenditure on health and Income in Nigeria over a period 2004-2015. He employed the Computable General Equilibrium (CGE) model, he observed public sector spending on health in the country was a contributing factor in impacting on economic progress, and that the urgent need to reallocate scarce funds from other non- performing key sectors to provide health care to the people will fast track economic progress in the Country

Halil et al (2006) performed the examination of no motion and association of healthcare spending and National Income in Turkey, used Johansen cointegration method in investigating long term association among GDP, healthcare spending and population growth. The result revealed long run association among the variables.

In collaborating earlier findings of direct association between health care spending and economic progress, Ayoola et al (2012) working on test of cointegration of healthcare spending and economic progress in Nigeria over a period 1970-2009, employing Augmented Dickey Fuller (ADF) and Vector Autoregression (VAR) methods respectively. They noted that there existed a positive and long-term relationship among health expenditure, population, total savings, foreign aid, and real Gross Domestic Product (GDP). However, the most outstanding finding of this study is that foreign aids (which represent funds from Development Partners) which is assumed as a complement to the local investment on health infrastructure did not contribute effectively during the period of study.

Dauda (2011) studied the association between public expenditure on health and economic progress in Nigeria within 1970-2009. He used Johansen cointegration technique, descriptive statistics and ECM, this study revealed Health spending to be significant. However, second and third lags coefficient of the estimated model are negative and significant. However, ECM is significant and came out with expected negative sign coefficient of 0.4 showing that the pace of changes is 40%.

Goel and Garg (2011) in their study of the association between Government health expenditure and economic progress in Haryana State, India, used data for the period 1991-92 to 2007-08. The empirical result revealed a unidirectional causal association between public expenditure on health and economic progress in Haryana State. Also, direction of causal relationship is from economic progress to public expenditure on health.

Similarly, Chete and Adeoye (2002) studied the experimental forces on how education and health influences economic progress in Nigeria. In order to realize the objective, they used Ordinary Least Square (OLS) and Vector Auto Regression (VAR) analysis as tools of bringing their influences into perspective. From the findings they concluded that human capital

positively and significantly influenced progress which the various Nigerian governments have appreciated after gaining self-rule by serious expansion of educational infrastructure across the country.

Bloom et al (2004) estimated a production function on how health influences economic progress as a relationship of labour, education, capital stock, experience and health (Health Capital). The result showed that health positively and significantly impacted on economic progress. The study suggested that one year appreciation in the life expectancy of the citizenry contributes to a growth of 4% in output. This finding collaborates other results on the importance of health to economic progress. It means an appreciation in health will lead to increase in growth not only through labour output, but also by the accumulation of capital.

In the same vein, Sulku and Caner (2011) explored the long-run association between per capita income and per capita health spending and increase in population for Turkey over the period of 1984-2006. Johansen multivariate cointegration technique was employed, the results revealed that a 10% increase in per capita income results in 8.7% growth in total per capita health spending controlling increase in population.

Elmi and Sadeghi, (2012) investigated causality and cointegration relationship between economic progress and health care spending in less developed nations. They applied panel cointegration and causality in Vector Error Correction Model (VECM) during 1990-2009. The empirical findings showed a short-term causality from Income to health care spending and the opposite never existed. However, in the long-term there is a close and related association between economic progress and health spending, and bilateral causality exist.

In addition, Bukenya, (2009) investigated the association between health spending and economic progress at United States (U.S) State level measured by Gross State Product (GSP), in the South East United States over the period 1980-2004 by using time series approach. He used the Johansen Multivariate Cointegration and Granger Causality test. The empirical findings showed a weak, but positive relationship between the variables. Granger test revealed a feedback effect between GSP and personal health care expenditure for Georgia and unidirectional effect for Mississippi and Tennessee.

Ogundipe and Lawal (2011) worked on how health spending influenced economic progress over a period 1985-2009, using Ordinary Least Square (OLS). However, this study concluded that if resources are put into proper use and spent on health infrastructure, the positive association between economic progress and health will definitely grow beyond limitation. Some other researchers came up with findings that shows negative association between health spending and economic progress. In their work Acemoglu and Johnson (2006) studied impact of life expectancy on economic progress using Nigeria as a case study, using Ordinary Least Square technique for the period 1960-2000. The result revealed that life expectancy impacted negatively on per capita economic progress.

Cetin and Ecevit (2010) investigated the association between health spending and economic progress with a sample of 15 OECD countries for period 1990-2006. They employed pooled regression model by panel OLS method. The regression results revealed that no significant association existed between the health spending and economic progress.

Erdogan E, et al (2013) investigated the strategic role of Infant Mortality in the process of Economic Growth on 25 OECD Countries for period 1970-2007, employed the Panel Unit Root techniques and descriptive statistics. The result revealed that a negative relationship exists between infant mortality and real per capita GDP. The study concluded that countries with better technical innovation are most likely to reduce infant mortality.

In another work Mehrara and Musai (2011b) investigated the Cause and effect between health expenditure and economic progress among eleven (11) Petroleum producing nations within 1971-2007. They employed panel unit root tests and panel cointegration techniques respectively. However, outcome of these tests suggested that income earned and economic progress causes health spending in the Petroleum producing nations. Also, health spending didn't impact significantly on Income both the short and long terms respectively.

However, Olulu et al (2014) examined the empirical association between public spending and economic progress in Nigeria. They used yearly data over a period 1984-2010. They employed the Simple Regression (OLS) technique and Augmented Dickey Fuller (ADF) Test. Result showed a negative interaction between public health expenditure and economic progress in the Country. It means that resources expended by government on the health care was not sufficient to change Income of the Nigerian economy within the period investigated.

In a related study, Mehrara and Musai (2011a) examined causal association between health spending and Income in Iran for a period 1979-2008. Gregory-Hensen cointegration techniques which provides for the existence of future structural breaks in data was employed. Results from cointegration test showed a long-term association between health spending and economic progress. Furthermore, results of Granger test showed a strong causality running from GDP to health spending, although the credence to the view that health spending contributes to long run economic progress was not provided for. This study supports earlier studies that revealed that it is economic progress that Granger causes health especially in the developing countries.

Also, Hassan and Kalim (2012) investigated existence of long-term association and triangular causality among real individual income, individual education spending and individual health spending in Pakistan, using Auto Regression Distributive Lag (ARDL) bounding and Granger causality tests during 1972-2009 period. The findings showed that a two-way granger causality exist among real individual income, individual education spending and individual health spending in long term.

Collaborating earlier works on Pakistan, Akram et al (2008) studied the association between different indicators of health and economic progress in Pakistan over a period 1972-2006. They employed the cointegration, Error Correction Model and Granger Causality Test techniques. Outcome showed there existed causality from health indicators to per capita GDP. It further revealed that individual income is positively influenced by health indicators in the future. In the present, health indicators did not affect per capita income significantly. This shows that health indicators impacted significantly on economic progress.

In the same vein, Bakare and Sanmi (2011) explored the association between public health care spending and economic progress for Nigeria within 1974-2008, employing Least Square Multiple Regression analytical method. The empirical findings showed that a significant and direct association existed between health care spending and economic progress within investigated period.

Eneji et al (2013) examined health care expenditure, health level of importance and national output in Nigeria using annual data over the period 1999-2012 and Multiple Regression Analysis Techniques. The result showed a strong causal interrelationship among health status, unemployment, nutrition, poverty and national productivity in Nigeria. They further suggested that it will benefit Nigeria to invest heavily in healthcare. This they said can be achieved by dedicating attention to the citizens' health in the interest of the country and world economic development. Spending on health and its outcome have significant influence on people living together in a house, individuals and the country economy. Hence, placing health high on the priority list of the development agenda and executing all the basic health policies will enhance national productivity.

In further to examining the effect of health spending on economic progress, Tang and Ch'ng (2011) investigated this relationship for five South East Asian countries ASEAN-5 economies using cointegration and Granger causality techniques. The study showed that health spending and income are cointegrated only for Indonesia, Singapore and Thailand. However, for Malaysia and Philippines, long run relationship is not found between health expenditure and income. But the empirical result of the Granger test revealed that a one-way causality from income to health existed for Malaysia, Philippines, Singapore and Thailand. No causality existed for Indonesia in any direction.

Olaniyan et al (2013) examined long term economic association between spending on health care and National Income among 32 Sub-Sahara African (SSA) nations within 1995-2009. They used panel unit roots and co-integration techniques respectively, they noticed future association between health spending and national income among the nations under reference. The study further investigated mean reversion and co-integration properties among health care spending and national income, health care spending, overall population of those aged 65, and those below 15 years of age, thereby, measuring elasticity of income of health care. The result further showed an income elasticity value of 0.46 for most of the countries, which means that health care is necessary and important to the growth of the people.

George et al (2013) investigated Public Expenditure and Health status in Ghana using Multiple Regression analysis over the period 2001-2010. The result revealed that the availability of physicians and health insurance are the most important determinants of health status in Ghana. Also, National Health Insurance Policy was also statistically significant in determining health status.

Oni (2014) evaluated how health spending influenced economic progress in Nigeria, employing annual data from 1970-2010, and Multiple Regression analysis. The empirical results showed that Gross Capital Formation (GCF), total health spending and labour output are major factors affecting economic progress in Nigeria, while years individuals are expected to live has negative influence on progress for the investigated period.

2.1 Health Capital Model Theory

The hidden rules for analyzing impacts of public health spending on economic progress in this work is that of Grossman (1972) health capital model. In this model, the consumer is taken to obtain satisfaction at its fullest within his earnings and time limits and a health wear and tear function. He differentiates between using health as a consumer good that implies requesting fine health, and using health as an investment good, implying derived request for fine health calling for the use of medical services. The analysis in this work is that of investment model, with individuals and government spending resources in health care to achieve good health and economic progress (see Arthur, 2013).

Grossman (1999) showed the satisfaction maximizing problem of the consumer as an interphysical issue where the consumer increases his/her satisfaction over a period of time is specified thus;

Ut = U(Ht, Zt), t=0, 1, 2 …… 2.1

Where Ht is stock of health and Zt is a basket of consumption of goods. This satisfaction is increased depending on the budget limit of the consumer over a period of time, specified below;

$$\sum_{t=0}^{n} \frac{Pm\,Mt + PxXt}{(1+r)t} = \sum_{t=0}^{n} \frac{Wt\Omega}{(1+r)t} + Ao \ldots\ldots\ldots\ldots\ldots\ldots .2.1.2$$

Where r is the discount rate, Pm and Px represents costs of medical inputs and other goods and Mt is a basket of medical services and Xt is other goods in the consumption basket. Wt is the hourly wage rate of the consumer and Ao represents First assets. Ω is the overall number of times at the disposal of the consumer. The right-hand side represents the discounted life time earnings plus his/her original wealth. Hence, the consumer increases equation 2.1 depending on 2.1.2. The first order condition produces the outcome that marginal benefit of health care use must be equal to marginal cost.

But however, Grossman (2000) derives a reduced form equation that can be estimated from household/individual/government survey data as follows;

In Ht = α Inhlt + pEdu - δt - Ine …….. 2.1.3

Equation 2.1.3 presents a health demand function, which according to Grossman also doubles as a health production function in the investment model, as the individual/government is taken to spend in health care as to enhance health and also maximize output and progress. hlt represents health investment, and Edu represents education, t is a time factor that represents the wear and tear in health that goes with age. The work suggests the influence of health on economic progress by the relationship below as;

Yit = f (Kapit, Labit, Eduit, Hltit) - - - - - 2.1.4

Equation 2.1.4 above represents the productivity of goods in country i at time t as a function of Capital (Kapit), labour (Labit) and human capital, which is catched with two components, education (Eduit) and health (Hltit). Hence, this work assumes that the manufacturing of goods is in the functional form specified in equation 2.1.4.

3. THEORETICAL FRAMEWORK, METHODOLOGY AND DATA

The theoretical foundation of this model is the endogenous growth theory. According to this theory, policy measures such as government spending or investment in human capital such as health will influence the long run increase rate of an economy. In the model by Lucas (1988), non-financial (human) capital is introduced into the production function in the same manner that technology entered into the Solow model, but in an augmented form. Based on this theoretical assumption, the endogenous growth model incorporating human capital alongside the traditional factors of economic activities like labour force and physical capital can be expressed as:

RGDP = f(LR, GCF, HTH) 3.1

Whereas;

RGDP = real gross domestic product, measuring economic growth
LR = Adult Literacy rate representing quality of labour force
GCF = physical capital, represented by gross fixed capital formation
HTH = human capital variable (health expenditure)

From the model in 3.1 above, the human capital variable can be by health expenditures. Based on this, model 1 of this study can now be written as follows.

Model 1

RGDP = (LR, GCF, HTH,) 3.2

The model in (2) in its explicit form can be written as:

$RGDP = \beta 0 + \beta 1\ LR + \beta 2GCF + \beta 3HTH + U$ 3.3

The above model in its logarithmic form can be written as:

$LOG(RGDP) = \beta 0 + \beta 1LOG(LR) + \beta 2LOG(GCF) + \beta 3LOG(HTH) + U1$ 3.4

Where:

β0 to β3------ parameters to be estimated and U1 ---- stochastic error term.

Due to criticism trailing government budgetary allocation in the Nation, the health spending in equation (3.2) above is further disaggregated into recurrent and capital health expenditures in order to assess comparatively their impacts on economic growth, hence model 2 for this study as.

Model 2

RGDP = (LR, GCF, RECHTH, CAPHTH) 3.5

Equation 3.5 in its logarithmic linear form can be expressed as:

$LOG(RGDP) = a0 + a1LOG(LR) + a2LOG(GCF) + a3LOG(RECHTH) + a4LOG(CAPHTH) + U2$ 3.6

Where:

a0 to a4 ----- parameters to be estimated and U2 ---- stochastic error term.

In addition to examining the influence of health spending on economic progress, the study also looks at the association between selected health indicators such as life expectancy, under-5 mortality and infant mortality on economic growth. This forms the model 3 for this study expressed as.

Model 3

RGDP = f(LR, GCF, LEXP, INFAN) 3.7

Equation (3.7) in its logarithmic linear form can be expressed as:

$LOG(RGDP) = \delta 0 + \delta 1LOG(LR) + \delta 2LOG(GCF) + \delta 3LOG(LLEXP) + \delta 4LOG(LINFAN) + U3$ 3.8

To avoid the problem of collinearity, Infant Mortality and Under-five Mortality are separated. Thus, model is specified as;

Model 4

RGDP = f(LR, GCF, LEXP, U5MORT) 3.9

Equation (9) in its logarithmic linear form can be expressed as:

$LOG(RGDP) = \alpha 0 + \alpha\ 1LOG(LR) + \alpha\ 2LOG(GCF) + \alpha\ 3LOG(LLEXP) + \alpha\ 4LOG(U5MORT) + U3$ 3.10

Where:

RGDP = real gross domestic product, measuring economic progress
LITRCY = Adult Literacy rate representing quality of labour force
GCF = physical capital, represented by gross fixed capital formation
HTH = total expenditure on health
RECHTH = recurrent health expenditure
CAPHTH = capital health expenditure
LEXP = life expectancy
U5MORT = under-5 mortality

INFAN = infant mortality

Gross Domestic Product (GDP)
This measures the overall economic activity undertaken in an economy within a time period usually a year. This parameter is expected to be in the affirmative.

3.1 Data Collection Sources
The necessary data for this study were extracted from secondary sources obtained from the National Bureau of Statistics (NBS), The Statistical Bulletins of the Central Bank of Nigeria (CBN) and the various issues of Annual Reports and Statements of Accounts of the Central Bank of Nigeria (CBN). Data were also gotten from the World Bank Database (2013). The needed data were extracted on yearly basis covering the period from 1970 to 2013. Data on under five death, Infant death and Life Expectancy at Birth, were obtained from the World Bank Database, 2013. Infant Mortality is measured by the number of infant deaths per 1000 live birth. While life Expectancy at Birth is measured by number of years citizens of a country life. Under five Mortality is measured by the number of mortalities before five years of age per 1000 live birth. Data for Real Gross Domestic Product, Recurrent Health Spending, Capital Health Spending and Gross Fixed Capital Formation, were collected from the various year's statistical bulletins of the Central Bank of Nigeria, and various issues of the Statement of Accounts and Annual Reports of the Central bank of Nigeria. Adult Literacy rate is obtained from National Bureau of Statistics. Real Gross Domestic Product is measured in 1990 constant prices in millions of naira. Gross Fixed Capital Formation, Public Health Expenditures are measured in current basic prices also in millions of naira.

3.2 The Unit Root Test
The unit root tests were performed to establish whether the variables were stationary or not. In particular, these tests were carried out to determine the integrating order of the variables. This test was carried out for two basic reasons. One, it is carried out to avoid estimating spurious regression results. Two, the test was also conducted since it is one of the requirements for assessing the causality relationships among the variables. That is, the causality test can only be conducted after it was found that the variables in the model are stationary. For this purpose, the Augmented Dickey–Fuller (ADF) test and the Phillips-Perron (PP) test were employed to assess the stationary properties of the variables in the specified models. Hence, utilizing the Dickey and Fuller (1979) specification, the unit root equation is estimated as follows:

$$\Delta y_t = \alpha_0 + \alpha_1 \Delta y_{t-1} + \sum_{j=1}^{j} \beta_i \Delta y_{t-1} + \varepsilon_t \text{...}(3.11)$$

Where:
ΔYt = Yt - Yt-1 describes the difference operation of series Yt;
ΔYt-1 = Yt-i - Yt-2 describes the first difference operation of Yt-1
et = the white noise error term
0, 1 and i were the parameters of the ADF equation to be estimated.
On the hand, utilizing the Phillips-Perron (1988) test, the unit root specification can be specified as follows:

$$y_t = \beta_0 + \phi y_{t-1} + \upsilon_t \text{..}(3.12)$$

Where:
βo and ϕ were the specified model parameters to be estimated; and
Vt is the stochastic residual disturbance term.

3.3 Cointegration Test
The Cointegration test involves investigating if there is presence of long-term association between the variables in the specified equations through the formulation cointegration equation provided the variables were integrated of the same order. However, the general rule governing the co integration test is the suggestion that there is existence of a future association among the variables based on the premise that the time series variables in question were integrated of the same order. The absence of co integration means the absence of future association among such variables. This means that the variables may be wandering afar off each other (Dickey, Jansen & Thornton, 1991).
The multivariate approach to cointegration developed by Johansen and Juselius (1990) was utilized in the determination of the future association among the macroeconomic variables captured in the specified models. To estimate the cointegration specification, the vector autoregressive model of order p was specified as follows:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta y_{t-i} + C + \varepsilon_t \text{...}(2.13)$$

Where ΔYt = the vector of the macroeconomic variables in time t, δ = the vector of constant term, i (i = 1…k-1) represents the coefficient matrix of the short-run dynamics of the model, = the long-term influence matrix, and ε= the vector of error term, which does not depend on the explanatory variables. The cointegration test was conducted utilizing both the trace test and the maximum eigenevalue test at five percent significant level.
Granger Causality Test
The study proceeded and examined whether any causality existed among economic progress and different parameters used in the model. In the work of Granger (1988), if two variables have long term association there is the likelihood of one

causing changes in the other at least in one way. This test was used in this work to find out the way in which spending on health and economic progress causes each other in Nigeria. Granger causality test for the study can be specified as:

$$RGDP_t = \sum_{i=1}^{j} \delta_{11i} RGDP_{t-i} + \sum_{i=1}^{j} \delta_{12i} HTH_{t-i} + U_{1t} \quad \text{.....(2.14)}$$

$$HTH_t = \sum_{i=1}^{j} \delta_{21i} HTH_{t-i} + \sum_{i=1}^{j} \delta_{22i} RGDP_{t-i} + U_{2t} \quad \text{.....(2.15)}$$

3.3 .1 Error Correction Model

This involves the specification of the short run estimates of the model. Error Correction Model (ECM) was specified to establish the reconciliation process between short run estimation and the long run estimation. In essence, the error correction mechanism (ECM) was meant to take into consideration the adjustment process from short run disequilibrium to the future stability. However, bases requirement for accepting the results of the ECM is that the adjustment coefficient must have a negative sign of its coefficient and must be statistically significant. Considering this situation, it means that the greater the absolute value of the error correcting coefficient, the faster it is to reach the long run equilibrium position. Thus, the short-term specifications based on equations 3.3 and 3.5 were specified as error correction mechanism (ECM) as follows.

$$\Delta RGDP_t = \lambda_0 + \sum_{i=1}^{j} \lambda_{1i} \Delta RGDP_{t-i} + \sum_{i=1}^{j} \lambda_{2i} \Delta LR_{t-i} + \sum_{i=1}^{j} \lambda_{3i} \Delta GCF_{t-i} + \sum_{i=1}^{j} \lambda_{4i} \Delta RECHTH_{t-i}$$
$$+ \sum_{i=1}^{j} \lambda_{5i} \Delta CAPHTH_{t-i} + \sum_{i=1}^{j} \lambda_{6i} \Delta LEXP_{t-i} + \sum_{i=1}^{j} \lambda_{7i} \Delta U5MORT_{t-i} + \sum_{i=1}^{j} \lambda_{8i} \Delta INFAN_{t-i}$$
$$+ \sum_{i=1}^{j} \lambda_{8i} \Delta HTHEXP_{t-i} + \phi ECM_{t-i} + U_t \quad \text{.....(3.16)}$$

Where: Ut and ɛt are the white noise error terms; ECM is the error correction variable, measuring the pace of adjustment.

4. ANALYSIS AND RESULTS

The results of the correlation analysis, indicating the degree of relationships among the variables captured in the study are presented in table 4.1 below.

Table 4.1: Correlation Matrix

	RGDP	LR	GCF	RECHTH	CAPHTH	HTHEXP	LEXP	INFAN	U5MORT
RGDP	1.000000	0.779749	0.891178	0.856228	0.804867	0.887374	0.960526	-0.950113	-0.957253
LR	0.779749	1.000000	0.496902	0.406686	0.565343	0.468271	0.695941	-0.828804	-0.824361
GCF	0.891178	0.496902	1.000000	0.923931	0.798261	0.939583	0.906911	-0.803265	-0.817322
RECHTH	0.856228	0.406686	0.923931	1.000000	0.739323	0.985076	0.855089	-0.757460	-0.770760
CAPHTH	0.804867	0.565343	0.798261	0.739323	1.000000	0.844186	0.832623	-0.755115	-0.767996
HTHEXP	0.887374	0.468271	0.939583	0.985076	0.844186	1.000000	0.893563	-0.796028	-0.809909
LEXP	0.960526	0.695941	0.906911	0.855089	0.832623	0.893563	1.000000	-0.962638	-0.968731
INFAN	-0.950113	-0.828804	-0.803265	-0.757460	-0.755115	-0.796028	-0.962638	1.000000	0.999521
U5MORT	-0.957253	-0.824361	-0.817322	-0.770760	-0.767996	-0.809909	-0.968731	0.999521	1.000000

Source: Researchers Computation, 2015

The results of the correlation analysis as presented in table 4.1 showed that there is a positive and high correlation relationship among real gross domestic product and adult literacy rate (0.78), gross fixed capital formation (0,89), capital health spending (0.80), recurrent health spending (0.86), total health spending (0.89), and life expectancy (0.96). On the other hand, the correlation analysis showed that there is a negative but high correlation among real gross domestic product and infant mortality (0.95), and under-5 mortality (0.96).

From the results, it is found that adult literacy rate, gross fixed capital formation, recurrent health spending, capital health spending, total health spending and life expectancy have direct association with real national income in Nigeria. Conversely, outcomes of the correlation analysis revealed that infant mortality and under-5 mortality have negative association with real gross domestic product.

Analysis of Results

4.3.1 Unit Root Tests

Table 4.2: The Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	Augmented Dickey-Fuller Statistics		
	Level	First Difference	Integrating Order
LRGDP	-2.401556	-6.047197	1(I)
LGCF	-1.952141	-7.656724	1(I)
LRECHTH	0.016856	-9.035625	1(I)
LR	-1.737191	-2.631962	1(1)
LLEXP	-1.292580	-2.780166	1(I)
LU5MORT	1.982269	-2.823240	1(I)
LINFAN	1.801598	-2.928464	1(I)
LHTHEXP	-0.087194	-10.35846	1(I)
LCAPHTH	-0.729221	-7.813058	1(I)
ADF critical statistics values at level: 1%=-3.592462, 5%=-2.931404, 10%=-2.603944			
ADF critical statistics values at 1st Diff:1%=-3.596616, 5%=-2.933158, 10%=-2.604867			

Source: Researchers Computation, 2015

Table 4.3: The Philips-Perron (PP) Unit Root Test

Variables	Phillips-Perron Statistics		
	Level	First Difference	Order of Integration
LRGDP	-5.292125	-6.058941	1(1)
LR	-1.854034	-7.614115	1(I)
LGCF	-2.050487	-7.646468	1(I)
LLEXP	0.028797	-3.717180	1(I)
LU5MORT	0.998890	-3.049348	1(I)
LINFAN	0.569777	-3.172411	1(I)
LHTHEXP	0.071118	-11.73545	1(I)
LRECHTH	0.347330	-17.28099	1(I)
LCAPHTH	-0.680937	-7.818772	1(I)
PP critical statistics values at level: 1%=-3.592462, 5%=-2.931404, 10%=-2.603944			
PP critical statistics values at 1st Diff:1%=-3.596616, 5%=-2.933158, 10%=-2.604867			
Source: Researchers Computation, 2015			

The empirical test outcome of the Augmented Dickey-Fuller test for the presence of unit root test in the parameters as presented in table 4.2 above showed that no stationary variable at level. Therefore, the study has failed not to accept the zero-level hypothesis that there was no unit root in the variables. But, at first differencing, all variables in the equation were found to be stationary and were integrated of order 1(1). Just like the ADF test, the Philips-Perron (PP) test as presented in table 4.3 above showed that one variable (RGDP) was motionless at level. Therefore, the zero level hypothesis of no unit root will not be rejected. But, at first difference, all parameters were motionless, hence are integrated of order 1(I)

Co-integration Test

Since the series is integrated of order 1(l), this suggested that there is the problem of unit root and hence the need to carry out cointegration test to find out whether the variables have long term equilibrium association. The results of the co-integration test based on the Johansen and Jesulius multi-variate approach based on maximum eigenvalue and Trace tests respectively were reported in tables 4.4a and b below.

Table 4.4a: Trace Test for Co-integration

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.962415	506.9257	197.3709	0.0001
At most 1 *	0.921019	372.3982	159.5297	0.0000
At most 2 *	0.809014	268.3180	125.6154	0.0000
At most 3 *	0.757795	200.4402	95.75366	0.0000
At most 4 *	0.674673	142.3034	69.81889	0.0000
At most 5 *	0.643334	96.26343	47.85613	0.0000
At most 6 *	0.570065	53.99430	29.79707	0.0000
At most 7 *	0.363671	19.38532	15.49471	0.0123
At most 8	0.020559	0.851716	3.841466	0.3561

Series: LRGDP LGCF LR LLEXP LU5MORT LINFAN LRECHTH LCAPHTH LHTHEXP				
Trace test indicates 8 cointegrating eqn(s) at the 0.05 level				
* Denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Table 4.4b: Maximum Eigenvalue Cointegration Test				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.962415	134.5275	58.43354	0.0000
At most 1 *	0.921019	104.0802	52.36261	0.0000
At most 2 *	0.809014	67.87786	46.23142	0.0001
At most 3 *	0.757795	58.13679	40.07757	0.0002
At most 4 *	0.674673	46.03994	33.87687	0.0011
At most 5 *	0.643334	42.26913	27.58434	0.0003
At most 6 *	0.570065	34.60898	21.13162	0.0004
At most 7 *	0.363671	18.53361	14.26460	0.0099
At most 8	0.020559	0.851716	3.841466	0.3561
Series: LRGDP LGCF LR LLEXP LU5MORT LINFAN LRECHTH LCAPHTH LHTHEXP				
Max-eigenvalue test indicates 8 cointegrating eqn(s) at the 0.05 level				
* Denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Outcomes of the test for cointegration based on both trace test as shown in table 4.4a and maximum eigenvalue as shown in table 4.4b indicated eight cointegrating equations in each of the tests. This is because, the calculated t-values in each of the cointegrating equation is higher than the critical values at five percent significant level. Going by these results, it can be concluded that there exist a future association among the variables.

Granger Causality Test

There exists a relationship among the variables of the study and the study proceeded to test for the cause-and-effect association between public health spending and economic growth. The outcome of the cause-and-effect test by Granger are expressed in table 4.5 below.

Table 4.5: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
RECHTH does not granger cause RGDP	43	1.36448	0.2497
RGDP does not granger cause RECHTH		4.71977	0.0358
G			
CAPHTH does not granger cause RGDP	43	1.21244	0.2774
RGDP does not granger cause CAPHTH		9.12108	0.0044
G			
HTHEXP does not granger cause RGDP	43	1.92841	0.1726
RGDP does not granger cause HTHEXP		6.71826	0.0133

Source: Researchers computation, 2015

The results as presented in table 4.5 above revealed a one way causality association moving from economic progress to recurrent health expenditure, capital health spending and total health spending in Nigeria. This goes to show that the growth of the economy granger caused an increased in health expenditure in Nigeria during the period investigated. This implies that an increase in national output (income) placed the country in a better position to spend more resources in the health sector. This finding is in consonance with earlier studies such as Alhowaish (2014), Mehrara and Musai, (2011a), and Tang and Ch'ng (2011), etc.

Analysis of Results of Model 1

Table 4.6: Over-parameterized Results of Model 1

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.066848	0.095755	0.698112	0.4909
DLRGDP(-1)	0.145651	0.172291	0.845378	0.4051
DLRGDP(-2)	-0.12092	0.153504	-0.787732	0.4375

DLR	-0.003475	0.018318	-0.189725	0.8509
DLR(-1)	0.00563	0.01742	0.323195	0.7489
DLR(-2)	0.008842	0.020426	0.432885	0.6684
DLGCF	-0.035302	0.091084	-0.38758	0.7013
DLGCF(-1)	0.017311	0.099753	0.173535	0.8635
DLGCF(-2)	0.143239	0.097397	1.470672	0.1525
DLHTHEXP	-0.076438	0.119214	-0.641183	0.5266
DLHTHEXP(-1)	0.234742	0.122784	1.91183	0.0662
DLHTHEXP(-2)	-0.098192	0.119262	-0.823326	0.4173
ECM(-1)	-0.136438	0.112446	-1.213367	0.2351
R-squared	0.43439	Adj. R-squared		0.191986
F-statistic	1.792009	Durbin-Watson stat		2.209551

Source: Researchers computation, 2015

Following from the empirical estimation of over-parameterized form of equation 1as indicated in table 4.6, the variables that were significant statistically were chosen and included in the empirical estimation of the short-term error correction model for the parsimony of the variables. The outcome of the parsimonious error correction model based on model 1are presented in table 4.7.

Table 4.7: Parsimonious Error Correction Results of Model 1

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.030355	0.051208	0.592789	0.5569
DLGCF(-2)	0.120054	0.068952	1.741108	0.09
DLHTHEXP(-1)	0.292191	0.081481	3.585983	0.001
ECM(-1)	-0.145942	0.072548	-2.011649	0.0516
R-squared	0.392344	Adj. R-squared		0.343074
F-statistic	7.963230	Durbin-Watson stat		1.894038

Source: Researchers computation, 2015

The parsimonious results as presented in table 4.7 above showed that error correction factor appeared with the correct sign with negative coefficient and significant as theoretically expected. Error correction coefficient value of 0.15 showed that 15 percent imbalance in the real income was corrected yearly. This value shows a low pace of changes from short term imbalance to long term balance.

The R-Squared of 0.392 showed that the estimated model did not explain high percentage of changes on the dependent variable. In particular, the adjusted R-Squared of 0.343 showed that about 34 percent of overall changes in the regress and (i.e. the dependent variable) has been accounted for by changes in the regressors (i.e. the explanatory variables). F-Statistics value of 7.968 showed that the entire model was significant at accepted one percent and five percent significant levels respectively. It is so because the F-statistics value calculated of 7.97 is higher than the tabulated values of 4.31 and 2.84 at one percent and five percent significant levels. It shows independent variables have joint impact on the dependent variable.

The Durbin-Watson statistics value of 1.89 is closer to 2 and fell in the region of no-autocorrelation of the Durbin-Watson critical regions. This means there is no serial correlation among the residual terms in the equation. This also implies that the model is well-specified and well-behaved and its findings can be applied in the Nigerian economy for policy purposes.

Analysis of the short run coefficients showed that two period lagged value of gross capital formation has direct and significant association with real gross domestic product in line with a prior expectation. This is so given the fact that, t-statistics value calculated of 1.741 is greater than critical value of 1.296 at 10 per cent significant level.

The results further showed that one period lagged value of total health expenditure has direct influence on real income in Nigeria. The result agrees with a prior expectation, showing that one percent growth in total health spending resulted in the growth of real income by 0.29 per cent after one year. The total health expenditure value was also statistically significant as the t-statistic value calculated of 3.586 is higher than the critical value of 2.00 at 5 percent significant level. It shows that total health expenditure has direct influence on economic progress in the Nation within the period under reference.

Analysis of Results of Model 2

Model 2 analyzes the outcomes of the disaggregated public health expenditure and their influence on economic growth in Nigeria. Table 4.8 below indicated the estimated outcome of the equation two's over-parameterized results.

Table 4.8: Over-parameterized Results of Model 2

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.055838	0.091233	0.61204	0.546
D(LRGDP(-1))	0.190531	0.176214	1.08125	0.2899
D(LRGDP(-2))	-0.148579	0.151045	-0.9837	0.3347
D(LR)	-0.006797	0.019109	-0.3557	0.7251
D(LR(-1))	0.014441	0.018034	0.80075	0.4308
D(LR(-2))	0.011032	0.019946	0.55311	0.5851
D(LGCF)	-0.029508	0.088975	-0.3316	0.7429
D(LGCF(-1))	0.031068	0.103724	0.29952	0.767
D(LGCF(-2))	0.203136	0.101485	2.00164	0.0563
D(LRECHTH)	-0.055856	0.101163	-0.5521	0.5858
D(LRECHTH(-1))	0.140712	0.114326	1.2308	0.2299
D(LRECHTH(-2))	-0.025436	0.098169	-0.2591	0.7977
D(LCAPHTH)	-0.10549	0.099241	-1.063	0.298
D(LCAPHTH(-1))	0.163936	0.105488	1.55408	0.1327
D(LCAPHTH(-2))	-0.150131	0.107593	-1.3954	0.1752
ECM(-1)	-0.105288	0.124257	-0.8473	0.4048
R-squared	0.528101	Adj. R-squared		0.244962
F-statistic	1.865163	Durbin-Watson stat		2.107077

Source: Researchers computation, 2015

The estimation outcome of the over-parameterized specification of model 2 as shown in table 4.8 above showed that the error correction variable appeared with correct sign but was not significant. The coefficient of error correction variable showed that 11 percent of the imbalance in the real National Income has been corrected each year. This is rather a low speed of changes from short term imbalance to long term balance. The estimated over-parameterized regression model has a good fit, given the value of R-Squared of 0.528. This showed that about 53 per cent of overall changes in the explained variable (i.e. the dependent variable) have been explained by changes in the regressors (i.e. the independent variables), while balance of 47 percent is explained by variables the model did not account for. It shows the estimated model has a fine explanatory power. It means the explanatory variables have joint impact on the dependent variable. The Durbin-Watson statistics value of 2.10 showed that there is no serial correlation among the residual terms in the model. This means that the model is well-behaved and its findings can be employed for policy purposes in the Nigerian economy. From the over parameterized results depicted in table 4.8, the statistically significant variables were selected and included in the parsimonious model in table 4.9.

Table 4.9: Parsimonious Error Results Model 2

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.051117	0.051538	0.99184	0.3277
DLGCF(-2)	0.095452	0.070317	1.35745	0.1829
DLCAPHTH(-1)	0.250112	0.079603	3.14199	0.0033
ECM(-1)	-0.155351	0.076923	-2.0196	0.0507
R-squared	0.335949	Adj. R-squared		0.282107
F-statistic	6.239543	Durbin-Watson stat		2.107077

Source: Researchers computation, 2015

The parsimonious results of model 2 as presented in table 4.9 showed that the explainability influence of the model is low, given R-squared value of 0.336 and adjusted R-squared value of 0.282. This showed that only about 28 per cent of the overall changes in the regress and (i.e. the dependent variable) have been attributed to changes in the independent variables while balance of 72 percent is explained by variables not captured in the model. This means that the variables captured in this study may not be the only variables influencing the dependent variables during the evaluation period. The F-statistics calculated value of 6.240 is higher than the tabulated values of 4.31 and 2.84 at one percent and five percent significant level. It showed overall model is statistically significant. This also means the explanatory variables have joint influence on the dependent variable. Durbin-Watson statistics value of 1.78 revealed no serial correlation among the residual terms in the model. This means that the model is well-behaved and its findings can be employed for policy purposes in the Nigerian economy.

Analysis of the short run coefficients showed that two periods lagged value of capital has direct and significant influence on real gross domestic product, and is consistent with a prior expectation. From the results, one percent increase in the

two-period lagged value of gross fixed capital will be led to growth in real gross domestic product by 0.1 per cent. The variable was also significant at 10 percent significant level as t-statistic value calculated of 1.357 is higher than the tabulated value of 1.296. This means that the parameter was significant in impacting real national income in Nigeria during the period investigated

In line with theoretical expectation, capital health expenditure has positive and significant association with real gross domestic product in Nigeria. It shows that growth in capital expenditure led to a growth in real gross domestic product in Nigeria. Existing independently, a one percent growth in capital health expenditure brought about the growth in real income by 0.25 per cent, all things being equal. The variable was also significant at five percent significant level. This is because the t calculated statistics value of 3.586 for capital health expenditure has exceeded the critical or tabulated value of 2.021 at five percent significant level. It goes to show that capital health expenditure has direct significant influence on real national income in the Country within the period under reference.

Analysis of Result of Model 3

The over-parameterized outcomes based on the specification of model three are shown below in table 4.10.

Table 4.10: Over-parameterized Results of Model 3

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.676177	0.223495	3.025467	0.0057
DLRGDP(-1)	0.493159	0.19899	2.478318	0.0203
DLRGDP(-2)	0.223885	0.17595	1.272436	0.2149
DLR	0.027894	0.018696	1.491945	0.1482
DLR(-1)	-0.017483	0.020042	-0.872348	0.3913
DLR(-2)	-0.013382	0.02594	-0.515893	0.6105
DLGCF	-0.122476	0.099776	-1.227505	0.2311
DLGCF(-1)	-0.093804	0.108189	-0.867034	0.3942
DLGCF(-2)	0.009019	0.090373	0.099795	0.9213
DLLEXP	-26.26103	27.84168	-0.943227	0.3546
DLLEXP(-1)	3.128884	25.68178	0.121833	0.904
DLLEXP(-2)	30.4963	29.2117	1.043976	0.3065
DLINFAN	-35.95481	46.18625	-0.778474	0.4436
DLINFAN(-1)	147.5549	89.13315	1.655444	0.1103
DLINFAN(-2)	-82.34457	50.31554	-1.636564	0.1143
ECM(-1)	-0.533088	0.261047	-2.042115	0.0405
R-squared	0.559909	Adj. R-squared		0.295854
F-statistic	2.120426	Durbin-Watson stat		2.144028

Source: Researchers Computation, 2015

The over-parameterized results of model 3 as presented in table 4.10 above showed high explainability influence of the model, given R-squared of 0.560. In particular, R-squared of 0.560 indicated that about 56 per cent of the total changes in economic progress have been provided by variations in the independent numbers that can vary. The Durbin-Watson statistics value of 2.14 showed there is no serial correlation in the model. Hence, the results of this model can be applied for policy formulation in the Nigerian economy.

The error correction factor came out with the correct negative sign and is significant in accordance with theoretical expectation. The coefficient of the ECM of 0.53 showed that 53 per cent of the imbalance in economic progress was corrected each year. This showed a high pace of changes from short term imbalance to long term equilibrium.

The Parsimonious Error Correction Results of Model 3

From the over parameterized results depicted in table 4.8, the statistically significant variables were selected and included in the parsimonious model in table 4.10. The outcome of the parsimonious short run error correction model are presented in table 4. 11below.

Table 4.11: Parsimonious Error Correction Results on Model 3

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.405004	0.111194	3.642328	0.0009
D(LRGDP(-1))	0.285716	0.145142	1.968536	0.0570
D(LR)	0.018553	0.014063	1.319305	0.1956
D(LINFAN(-1))	75.5001	20.74737	3.639021	0.0009
D(LINFAN(-2))	-61.10542	18.93311	-3.227437	0.0027
ECM(-1)	-0.677304	0.144156	-4.698412	0.0000
R-squared	0.421234	Adj. R-squared		0.338553
F-statistic	5.09470	Durbin-Watson stat		2.08544

Source: Researcher's computation, 2015

The outcomes of the parsimonious short run dynamics model as depicted in table 4.11 above revealed that the error correction factor is negative, fractional and significant in consistence with theoretical expectation. The coefficient of the error correction factor of 0.68 indicated that 68 percent of the disequilibrium in economic progress is being corrected each year. This represents a fast pace of changes from short term imbalance to long term equilibrium.

F-statistics value of 5.09 showed the statistically significant of the overall model at the acceptable one percent significant level and five percent significant level. It is because the f-statistics value calculated of 5.09 is higher than the critical value of 3.51 and 2.45 at one percent and five percent significant level. The importance of the overall model means that the dependent variables have joint influence on the dependent variable. The implication of this is that there is positive and direct association between the dependent and the explanatory parameters. Meanwhile, Durbin-Watson statistic value of 2.08 showed that the value fell in the region of no-auto-correlation. Therefore, there is no auto-correlation among the residual terms in the model. Absence of auto or serial correlation among the residual term indicated that estimated model is specified based on accepted principles and correct.

Analysis of the short run coefficients showed that the previous one period value of real gross domestic product has direct and significant influence on its current value. The result agrees with a prior expectation, showing that a one percent growth in one period lagged value of real gross domestic product led to a growth in the current value of the real national income by 0.29 percent, ceteris paribus. The variable was significant at 10 percent significant level as t-statistic value calculated of 1.97 is higher than the tabulated value of 1.303. The outcome also revealed that adult literacy rate has a direct and positive association with real gross domestic product. It also agrees with a prior expectation showing that a one percent growth in adult literacy rate will result to a growth in real income by 0.02 percent, other factors remaining the same. The variable was also significant at 10 percent significant level as t-statistic value calculated of 1.319 is higher than the tabulated value of 1.303. This means that adult literacy rate has significant impact on real output in addition to having the correct expected positive sign.

Further examination of the results showed that infant mortality has negative association with the real income in line with a prior expectation. This shows that a growth in infant mortality will cause a fall in the potential workforce and a fall in the real aggregate output. This negative impact of infant mortality rate on economic growth was however feasible after two years. In real terms, the results showed that a one percent growth in infant mortality will cause a reduction in real income by 61.10 percent other factors held constant. The variable was also statistically significance in influencing real gross domestic product in Nigeria during the reference period. In absolute terms, the t-statistics value calculated of 3.227 is higher than the tabulated value of 2.021 read from the table.

Analysis of Results of Model 4

The empirical outcomes of the over-parameterized specification of model 4 are depicted in table 4.12.

Table 4.12: Over-parameterized Results of Model 4

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.257797	0.230939	5.446449	0.0000
DLRGDP(-1)	0.650301	0.167168	3.890104	0.0007
DLRGDP(-2)	0.297887	0.143545	2.075219	0.0484
DLR	0.026748	0.015319	1.746023	0.0931
DLR(-1)	-0.044423	0.018293	-2.428433	0.0227
DLR(-2)	-0.032366	0.022406	-1.444535	0.1610
DLGCF	-0.265883	0.085225	-3.119783	0.0045
DLGCF(-1)	-0.337964	0.108986	-3.100990	0.0047

DLGCF(-2)	-0.188262	0.089229	-2.109877	0.0450
DLLEXP	-6.24517	22.11506	-0.282394	0.7800
DLLEXP(-1)	-5.549418	19.72127	-0.281392	0.7807
DLLEXP(-2)	15.09325	23.71668	0.636398	0.5303
DLU5MORT	9.365411	30.75407	0.304526	0.7632
DLU5MORT(-1)	95.67785	61.46879	1.556527	0.1322
DLU5MORT(-2)	-58.89994	35.2875	-1.669145	0.1076
ECM(-1)	-0.585819	0.256539	-2.283548	0.0216
R-squared	0.559909	Adj. R-squared		0.295854
F-statistic	2.120426	Durbin-Watson stat		2.144028

Source: Researchers computation, 2015

The empirical outcomes of the over-parameterized specification of model 4 as indicated in table 4.12 showed that the error correction variable came out with the right negative sign and was significant as theoretically expected. The coefficient of the error correction factor of 0.59 showed that 59 per cent of the deviation in the dependent variable was corrected each year. The model also has a high fit on the data and high explanatory power, given the high values of the R-squared of 0.698 and adjusted R-squared of 0.517. Moreso, value of F-statistics of 3.85 showed that the statistical significant of the overall model at 5 percent significance level. Lastly, Durbin-Watson statistic value of 1.73 showed absence of serial correlation and hence the model is well behaved. From the over-parameterized results of model 4 in table 4.12 above, the statistically significant parameters were chosen and utilized in the estimation of the parsimonious error correction model for the short term dynamics. The outcomes of the parsimonious short term dynamics are shown in table 4.13 below.

Table 4.13: Parsimonious Error Correction Results of Model 4

Dependent Variable: DLRGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.228733	0.203923	6.025491	0.0000
DLRGDP(-1)	0.637584	0.154061	4.138511	0.0003
DLRGDP(-2)	0.277224	0.128073	2.164580	0.0388
DLR	0.026540	0.013235	2.005251	0.0543
DLR(-1)	-0.044970	0.015898	-2.828713	0.0084
DLR(-2)	-0.037856	0.016131	-2.346752	0.0260
DLGCF	-0.260630	0.077538	-3.361296	0.0022
DLGCF(-1)	0.313244	0.092717	3.378504	0.0021
DLGCF(-2)	0.165378	0.077464	2.134907	0.0413
DLU5MORT(-1)	117.3827	18.68969	6.280611	0.0000
DLU5MORT(-2)	-73.59838	15.33035	-4.800829	0.0000
ECM(-1)	-0.552566	0.234392	-2.357444	0.0234
R-squared	0.691226	Adj. R-squared		0.574105
F-statistic	5.901815	Durbin-Watson stat		1.719015

Source: Researchers computation, 2015

The empirical results of the parsimonious short run model as presented in table 4.13 above showed that error correction factor is negatively signed, fractional and significant in consistency with theoretical expectation. Its coefficient of 0.55 showed that 55 percent of the imbalance in the real national income was corrected yearly aftershocks. This showed a fairly rapid pace of changes from short term imbalance to long term balance. The R-squared value of 0.691 showed that the explainability influence of the model is very high. In particular, the adjusted R-squared value of 0.574 showed that about 57 percent of the total variations in the dependent variables (RGDP) has been explained by variations in the independent variables (RGDP (-1), LR, GCF, and U5MORT). The remaining 43 percent not explained can be linked to changes in other factors affecting economic growth not provided for in the model. Therefore, the fairly high values of both R-squared and adjusted R-squared showed that the model has a high explanatory power.

The F-statistic value of 5.90 showed the statistically significant of the overall model at the conventional 1 percent and 5 percent significant level. It is because, the F-statistics value calculated of 5.90 is higher than the tabulated values of 2.84

and 2.09 at one percent significant level and five percent significant level. It means the model is entirely significant and also that the explanatory variables have joint effect on the explained variable.
The Durbin-Watson statistic value of 1.71 fell within region of absence of serial correlation of the Durbin-Watson critical regions. This showed there is no serial correlation among the residual terms in the equation. This is indicative to the fact that the model is well-behaved and its findings can be applied in the Nigeria economy for policy formulations. Meanwhile, analysis of the short run estimates showed that previous one and two period values of real gross domestic product have direct impact on the current value of real national income. These outcomes are in consonance with a prior expectation implying that one percent increases in the previous one and two period values of real gross domestic product led to increases in the current value of real gross domestic product by 0.63 percent and 0.27 per cent, ceteris paribus. The variables were significant at five significant level as t-statistics values calculated of 4.14 and 2.16 are all greater than the critical value of 2.042.
The results also showed that adult literacy rate has direct relationship with real national income in line with a prior expectation. This means that a one percent growth in adult literacy rate led to a growth in real gross domestic product by 0.03 percent, other factors remaining the same. Adult literacy rate is significant at five percent significant level as t-statistic value calculated of 2.05 is higher than the tabulated value of 2.041.
Further examination of results showed that gross capital formation has direct association with real national income in Nigeria. The result showed that theoretical expectation is achieved as expected, indicating that one percent increases in the previous one period value and two period value of the gross fixed capital formation led to increase in real gross domestic product by 0.31 percent and 0.17 percent respectively. The variables were also significant at five percent significant level as t-statistic values calculated of 3.379 and 2.134 are greater than the critical value of 2.045.
In line with theoretical expectation, under-5 mortality has negative association with the real gross domestic product in Nigeria, which implies that one percent growth in under-5 mortality resulted to a decrease in economic growth by 4.8 percent, ceteris paribus. The Under-5 mortality value is also significant at five percent significant level as t-statistic value calculated of 4.801 is higher than the tabulated value of 2.042.

4.4 Discussion of Findings

From the results obtained, the empirical investigation revealed that public health spending has significantly impacted on economic progress in Nigeria. The result is consistent with theoretical exposition which held that investment in health sector through public spending on health facilities influences the overall economic performance of a nation. This is so because as the saying goes “a healthy nation is a wealthy nation”. Findings from this work support earlier works like; Eneji et al (2013) for Nigeria; Olaniyan et al (2013) for a group of 32 Sub-Saharan African (SSA) countries; Oni (2014) for Nigeria; George et al (2013) for Ghana; Akram et al (2008) for Pakistan; Ogundipe and Lawal (2011) for Nigeria; Chete and Adeoye (2002) for Nigeria, amongst others.
The empirical results further revealed that infant mortality and under-five mortality impacted negatively on economic progress. This is so because an increase in childhood death has a strong attribute to lower the potential labour force of a country, which also leads to a decline in output. This result was synonymous with findings by Endogan, Ener and Arica (2013). Further analysis showed that adult literacy rate positively impacted economic progress in Nigeria. This result reaffirmed the vital role played by education in the process of economic progress. The result corroborated earlier finding by Reder (2010) that literacy proficiency affected economic growth via work experience, which also reflected the critical role played by increased accessibility to education and on the job training.
Lastly, the result showed that gross capital formation is directly associated with economic progress in Nigeria. This is true as increased accumulation of capital enhances the process of economic progress. This finding is in line with Oni (2014).

5. SUMMARY, POLICY RECOMMENDATIONS AND CONCLUSION

5.1 Summary of findings.

The relevant time series collected were estimated using various econometric methods. From the results obtained, the summary of the empirical results is as follows;
1. The causality association outcomes based on the pairwise granger causality test approach revealed the existence of a one-way causality moving from economic progress to recurrent, capital, and total health expenditures in Nigeria.
2. The outcomes of the regression showed that total public health spending have positive interaction with economic growth during the period investigated.
3. The results also showed that public capital health spending impacted positively on economic progress during the period investigated.
4. Adult literacy rate also impacted positively on economic progress during the study period. This result is consistent with a prior expectation, showing that adult literacy rate is a significant factor influencing productivity and hence economic growth in an economy.
5. Further examination of the results showed that gross capital formation has impacted on economic progress during the period investigated. This again confirmed that capital input is also a significant factor in a production function in line with a prior postulation.
6. Meanwhile, the empirical results revealed that infant mortality has negative and significant influence on economic progress in line with existing economic theory. This means that an increase in infant deaths has the ability to reduce the potential labour force and hence a reduction in output and growth.
7. Lastly, the results showed that under-five mortality has significant negative relationship with economic growth in line with a prior expectation. As the case in (vi) above, an increase in under-five mortality led to a fall in the potential labour force and hence a fall in economic growth.

5.2 Policy Recommendations

From our research findings, the study recommends that:

Government should increase her present budgetary provision to the health sector, especially Capital expenditure as to procure state of the art medical equipment for the skilled personnel.

Government should build qualitative education in Nigeria, so as to equip Labour Force with modern skills through training and re-training of existing labour force. These will go a long way to raising the quality of labour and hence their productivity.

Similarly, Government should propose programmes aimed at increasing level of capital accumulation in Nigeria. It can be realized by education and reorganization of the health sector as to attract more investment in health infrastructure and promote medical tourism.

5.3 CONCLUSION

This study was undertaken to empirically investigate the influence government spending had on health and economic progress in Nigeria. Theoretical literature on human capital has identified the importance of health in the process of economic growth of a nation. Meanwhile, before the desired condition of health of a nation is achieved, the government has to invest in the health sector in the form of government spending on critical health infrastructures.

For past four decades in Nigeria, government spending on health has been increasing. However, indicators of health conditions have seemed to be pointing disappointedly low and poor, prompting the question of whether the huge budgetary spending by the government has resulted to economic growth of the Nigerian economy as predicted by various models of human capital development.

Whether the above established theoretical postulation holds for Nigeria was the main thrust of this study. From the results of the correlation analysis, it is found that adult literacy rate, gross fixed capital formation, life expectancy, recurrent health expenditure, capital health expenditure, and total health expenditure have direct relationship with real income in Nigeria. Similarly, the results of the correlation analysis revealed that real income, infant mortality and under-5 mortality are indirectly related. The granger causality test showed that causality ran from economic growth to public health spending and not from public health expenditure to economic growth, confirming the earlier result from the regression analysis.

The results of the empirical estimation showed that public total health expenditure and capital health expenditure are directly and significantly related with economic progress in line with theoretical expectations. The results also showed that gross capital formation impacted on economic growth positively and significantly. Further examination of the results showed that adult literacy rate has direct relationship with economic progress in Nigeria. Conversely, the results showed that infant mortality rate and under-5 mortality rate have negative relationship with economic growth in Nigeria which agrees with theoretical expectations.

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