IMPACT OF PER CAPITA INCOME ON HEALTH OUT COME IN NIGERIA

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ABSTRACT

Expenditure on health care facilities enhance workers efficiency and the productivity of an individual.This paper investigates the impact of per capita income on health out come in Nigeria. Annual time series data from 1980 to 2016 on Life Expectancy (LE), Per Capita Income (PCI), Health Expenditure (HE) and Unemployment rate (UR) in Nigeria used in this work were obtained mainly from secondary sources and in particular from Central Bank of Nigeria Statistical Bulletin (2016). The Error Correction Mechanism and Johansen cointegration techniques were employed to examine the link between these variables in Nigeria. The results from the empirical analysis indicates that a long run relationship exist between LE, PCI, HE and UR. The results revealed that Health Expenditure (HE) is the only variable that is statistically significant in explaining Life Expectancy in Nigeria with the coefficient value of 0.564923 and pro-value of 0.0001. This implies that a unit change in Health Expenditure raised Life Expectancy of Nigerians by 56.5 per cent approximately. The results also revealed that unemployment ratehas an inverse and insignificant relationship with domestic investment. The error correction mechanism ecm (-) revealed a slow adjustment process, as the speed of adjustment to longrun equilibrium was only 36.8per cent approximately for Life Expectancy. The stability test conducted showed that the models have been stable over time. The study, therefore, recommended that government should make strong health policy that will give weight to health facilities in Nigeria to compete favourably with the international world. Also, the federal government should make macroeconomic policy that will reduce unemployment rate in Nigeria to enable both lower and middle class citizens to access health facilities in Nigeria and thereby increases life expectancy in the country.

Keywords: Life Expectancy, Per Capita Income, Health Expenditure and Unemployment Rate.

1.0 Introduction

The role of income to the wellbeing of the people in an economy is undoubtedly paramount. High income earners have access the various needs and thus improve the health status unlike low income earners. Some applies to the level of development in an economy. Per capita income is among the tools of classical and neoclassical economists used in the development of an economy. High income economies are termed developed economies while low income economies are termed as developing economies. There has been a strong relationship between health and income across countries, within countries and across individuals. Health constitute an extremely important aspect of human wellbeing and since individuals make a nation, healthcare could be regarded as an important prerequisite for the attainment of sustainable long term economic development (Matthew, Adegboye & Fasina, 2015). While the rising cost of health care system in both the developed and developing countries have been a debatable discussion, only few studies have been attempted to study the relationship between per capita income and health outcome, with an over increasing health expenditure. It is important to evaluate the effectiveness of such expenditure in terms of improvement in health outcome. Theoretically, if healthcare is a normal good, an increase in per capita income would be expected to increase the demand for health services.

It is a salient fact that investment in health brings about substantial benefit for an economy. Studies have shown that in the developing countries, people with higher income have better health status and lower mortality rate (Gwatain, Rustein, Johnson 7 Wagstaff, 2007). This view was equally supported by (Cutler, Deaton & Llera-muney, 2006) who noted that, infact mortality is noticeable in poor countries, approximately 30 percent of all death occurs in children under the age of five compared to less than 1 percent in rich countries. The millennium development goals (MDGs) declaration has trigged a lot of policy options for attaining the goals. However, it is so dis appointing that most countries in Africa are still far below the target of the MDGs as at 2015. Anyanwu and Ehiajakar (2008) observed that the estimate through 2005 shows that only 33 out of 147 countries (22%) in the developing countries are on track of achieving a two third reduction in mortality rate. However, it is quite unfortunate that all the countries in the Sub Sahara Africa are off the track and even in some countries, the mortality rate is on the increase.

Despite the huge amount spent on the health sector, the health outcome of Nigerians is not encouraging. Moreover, larger percentage of the government health expenditure is on expansion of medical care that benefits a small minority of the population living in the urban areas (Emeka *et al*.,2017). According to Nwanosike, Anthony, Joan and Sam (2015) the maternal mortality increased to 545 per in 2008, infant mortality rose from 91 per 1,000 in 1990 to 100 per 1,000 in 2003, a similar trend was observed for the under five mortality which worsened from 133 per 1,000 in 1991 to 201 in 2003, more than 2,400 under five children die daily from preventable diseases like malaria and malnutrition. Therefore, the objective of this paper is to examine the impact of the per capita income on health out come in Nigeria. This paper comprises of five sections of which section one is the introduction, section two is the literature review of the related literature, section three contains research methods and theoretical framework, section four dwells on the presentation of data and discussion of results, while section five is the concluding remarks.

2.0 Literature Review

In this section the review of related literature is undertaken. This review is done under the following headings: i. Conceptual issues, ii. Theoretical literature and iii. Empirical literature.

2.1 Conceptual Issues

Per capita income measures the average income earned by persons in a given area (city, region or country) in a specific year. It is calculated by dividing the total income by population. Per capita income is often used to measure a country's standard of living as well as to ascertain a country's development status.

World Health Organization has defined health as a complete state of physical, mental and social well-being, and not merely the absence of illness or disease (Jacobs & Rapoports, 2002 cited in Dewar, 2010). According to Phillips (2005) health outcome are the actual impact on the recipient and others arising from the deliverables generated by the functioning of health care processes and procedures of the health output quality.

Human capital is so important that in the Kharttoum Declaration of 1988, it wasasserted that the human dimension is the sine qua non of economic recovery. No Structural Adjustment Programme (SAP) or economic recovery programme should be formulated or can be implemented without having at its heart detailed social and human priorities. There can be no real structural adjustment or economic recovery in the absence of the human imperative (Oladeji, 2015). This implies that human capital is not only important to an entrepreneur as a factor of production but much so, as a driver of growth in per capita income.

Per capitaincome describes the measure of the average output, expenditure or earnings of all individuals in a nation in monetary terms. It is the ratio of gross domestic product to total population of a given society. This is why it is simply described as the national output per unit of labour in a given economy.Jhingan (2005) pointed out that in the process of national income or output per capita; it is customary to attach more importance to the accumulation of any physical capital than human capital as well as environmental quality depletion.

Measuring human capital development is a concept with many facets and complexities. According to Kairo, Mang Okeke and Aondo (2017), any index of human progress incorporates a range of indicators to capture these complexities. Organization for Economic Corporation and Development (OECD) measurement on human capital is closely linked to international comparable statistics considering investment in human capital, quality adjustments, and result of education. On the one hand, the human capital development is commonly measured using a composite index called the human development index (HDI). This index constitute health, knowledge, and standard living components using life expectancy at birth, expected years of schooling and quality of life as proxy respectively. Aside the HDI, there are other human development composite indices like the inequality-adjusted human development index, gender inequality index and multi-dimensional poverty index (Kairo, Mang Okeke & Aondo, 2017). On the other hand, there are other important indicators which includes life expectancy, per capita income and health expenditure.

2.2 Theoretical Literature

2.2.1 The Absolute Income Hypothesis

The basic idea that income is associated with health goes back a long way in the literature. This hypothesis was pronounced in the work of Preston (1975) who observed that the impact of additional income on health (as measured by mortality), is greater on those with higher income. In other words, health status improves with the level of personal income but at a decreasing rate. Thus a dollar transferred from the rich to the poor will improve the health of the poor person more than it will decrease the health of the higher income person.

Hence, this transfer will increase the average level of health of the members of the community. Deaton (2001) also noted that according to absolute income hypothesis, redistribution of income can improve health even if average income is not increased, and that redistribution from the rich to the poor countries would in principles improve worldwide average health.

2.2.2 Absolute Deprivation Hypothesis

The hypothesis posits that those with lowest income faces poor health and greater risk of mortality owning to a variety of factors associated with extreme poverty such as inadequate nutrition, lack of quality health care, exposure to a variety of physical hazard from poor environment, health behavour such as smoking and sedentary habits and stress resulting from coping with very low income (Ladin, Daniel & Kawalhi, 2009).

2.3 Empirical Literature

Damian and Chukwunonso (2014) investigated the effect of per capita income spending on child mortality in Nigeria using secondary data from 1980-2012. They examined the explanatory variables on the three dependent variables representing health outcome (under-five mortality, infant mortality and neonatal mortality rate) using multiple regression. The result shows that per capita health spending has no significant impact on infant mortality. However, the study finds a significant impact of per capita under five mortality

Boachie and Ramu (2016) examined the effect of public health expenditure on health status in Ghana using secondary data from the period between1990-2012. The study employed ordinary least square (OLS) to ascertain the impact of per capita income on health status (infant mortality). The result shows that only public health expenditure and education significantly reduce infant mortality, while the per capita and female participation in labour market both have negative but insignificant effect on infant mortality.

Aton and Onofrci (2012) conducted an OLS cross sectional data analysis of 18 central and eastern European countries with data for just 3 years (1995, 2000, 2008). The result shows that GDP per capita and total health expenditure have a negative and significant impact on child mortality. They also found that number of physician and urban population have a negative but insignificant impact on child mortality.

Gani (2008) conducted a panel data analysis on 7 countries from pacific island countries to check the impact of per capita public spending on outcome indicators (infant mortality, under five mortality and crude death rate) for the period of 1990-2002. He submitted that per capita income expenditure has a significant effect on all health outcome variables and also immunization have a negative and significant effect on health outcome.

Anyanwu and Erhuakpor (2007) examined the relationship between total health expenditure and per capita income and two health outcome (infant mortality and under five mortality) of 47 African countries between 1999 to 2004. The result shows that health expenditure has a statistically significant effect on infant mortality in African countries.

3.0 Research Methods

3.1 Theoretical framework

This study is based on the Absolute Deprivation Hypothesis. The hypothesis posits that those with lowest income faces poor health and greater risk of mortality owning to a variety of factors associated with extreme poverty such as inadequate nutrition, lack of quality health care, exposure to a variety of physical hazard from poor environment and health behavour of low income earners.

3.2 Model Specification

Based on the objectives of this study, one model was used to estimate the impact of per capita income on health outcome in Nigeria using Life Expectancy (LE) as dependent variable while Per Capita Income (PCI), Health Expenditure (HE) and Unemployment Rate (UR) are used as the dependent variables.

Model One

LE =f (PCI, HE, UR) ………………………………………………………………………. 3.1

Equation 3.1 above is the functional form while equation 3.2 represented the log linear form

$LE_t = a_0 + a_1LPCI_t + a_2LHE_t + a_3UR_t + U_t$ 3.2

A priori expectations are $a_1, a_2 > 0$ and $a_3 < 0$

Where:

LE = Life Expectancy,PCI = Per Capita Income,HE = Health Expenditure,UR = Unemployment Rate,U = Error term,a_0 = Constant or Intercept,$a_1 - a_3$ are the coefficients of the independent variables,L = log and t = time.

3.3 Sources of Data

The data used in this study were obtained from the central Bank of Nigeria statistical bulletin (2016), Annual report and statement of accounts, National Bureau of statistical bulletin (various issues) and other relevant documents.

3.4 Method of Data Analysis

The variable used in this study include Life Expectancy (LE) as dependent variable while Per Capita Income (PCI), Health Expenditure (HE) and Unemployment Rate (UR) are used as the dependent variables. The method used in analyzing the data collected for this research is basically descriptive and statistical in nature. Augmented Dickey-Fuller test statistics was employed to perform the stationarity test. Statistical theory requires that variables be stationary before application of standard econometric techniques. This was done in order to avoid spurious (misleading) results.

The Johansen cointegration test was also conducted to examine the existence or otherwise of a longrun relationship among all theselected macroeconomic and health indicators. The error correction model was thereafter estimated to determine the speed of adjustment to longrun equilibrium. Diagnostic and stability tests were also performed to confirm the robustness of the models.

4.0 Analysis of Data and Interpretation of Results

4.1 Unit Root Test

The stationarity status of the selected macroeconomic and health indicators in Nigeria are examined using the Augmented Dickey-Fuller test. The results which are displayed in Table 4.1 below showed that all the variables were integrated at first difference except Life Expectancy (LE) and Per Capita Income (PCI) which were stationary at level. In other words, they were found to be stationary at I(0). This implies that the hypothesis of non-stationarity was rejected for all the variables at their first difference. This justified the need to test for co-integration.

Table 4.1: Unit Root Test Results

Variable	Level	First Difference	Order of Integration
LE	-3.236773 (0.0264)	-1.520340 (0.5110)	I(0)
InPCI	-8.901440 (0.0000)	-36.77044 (0.0001)	I(0)
InHE	-0.372363 (0.9032)	-7.912464 (0.0000)	I(1)
UR	-2.111453 (0.2415)	-6.616112 (0.0000)	I(1)
5% C.V	5% = -2.945842	5% = -2.948404	

Source: Author's compilation with information from stationarity test results

Note:

i. Pro-value are reported in parenthesis.
ii. The Augmented Dickey-Fuller test statistics are compared to 5 per cent critical value (C.V).

4.2 Cointegration Test using the Johansen Methodology.

The results of the Unrestricted Cointegration Rank tests for the model when LE was used as the dependent variable is presented in Table 4.2 below. Starting with the null hypothesis that there are no cointegrating vector (r = 0) in the models, the results shows that there exists at least one cointegrating relationship in the model as both the Trace and Max-Eigen statistics reject the null of r = 0 against the alternative of r = 1 at 5 per cent level of significance which shows that there is a unique longrun relationship between Life Expectancy, Gross Domestic Product Per Capita, Health Expenditure and Unemployment rate in Nigeria (see the tables below).

Table 4.2: Unrestricted Cointegration Rank Test result for model l.

Hypothesised No. of CE(s)	**Trace Stat.**	**Critical Value (0.05)**	**Prob****	**Hypothesised No. of CE(s)**	**Max-Eigen Stat.**	**Critical Value (0.05)**	**Prob****
None*	52.16239	47.85613	0.0187	None*	30.88603	27.58434	0.0181
At most 1	21.27636	29.79707	0.3406	At most 1	13.00373	21.13162	0.4519
At most 2	8.272630	15.49471	0.4367	At most 2	7.509072	14.26460	0.4308
At most 3	0.763558	3.841466	0.3822	At most 3	0.763558	3.841466	0.3822

Source: Author's compilation with information from unrestricted cointegration rank results.

Note:

i. r represents number of cointegrating vectors.
ii. Both Trace and Max-Eigenvalue tests indicate 1 cointegrating equation at the 0.05 level respectively.
iii. ***** denotes rejection of the hypothesis at the 0.05 level
iv. ****** Mackinnon-Haug-Michelis(1999) p-values

4.3 Error Correction Representation (Short-run)

The results of the error correction representation of the model is reported in Tables 4.3 below.

Table 4.3: Error Correction Representation for the Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.195199	0.045843	4.257947	0.0002
D(PCI)	0.055935	0.110479	0.506297	0.6162
D(HE)	0.564923	0.098501	5.735201	0.0001
D(UR)	-0.136105	0.137110	-0.992670	0.8783
ECM(-1)	-0.368047	0.337504	-1.090496	0.0079

Source: Author's compilation with information from ECM results.

Dependent Variable: D(LE)
Method: Least Squares
Date: 05/04/18 Time: 09:28
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

The results of the error correction estimate in table 4.2b above showed that Per Capita Income(PCI) has a direct relationship with Life Expectancy and a 1 per cent increase in GDP Per Capita raised Life Expectancy of Nigerians by 0.6 per cent approximately.

The results further revealed that Health Expenditure(HE) is the only variable that is statistically significant in explaining Life Expectancy in Nigeria with the coefficient value of 0.564923 and pro-value of 0.0001. This impliesthat a unit change in Health Expenditure raised Life Expectancy of Nigerians by 56.5 per cent approximately.

The result also revealed that Unemployment Rate (UR) has an inversely and insignificant impact onLife Expectancy of Nigerians. It indicates that a 1 percent increase inUnemployment rate reduces Life Expectancy in Nigeria by13.6 percent approximately.

Finally, the error correction mechanism ecm(-) which is 0.368047 is statistically significant and has the appropriate sign (negative). It suggests, however, that there is a slow adjustment process in the Life Expectancy of Nigerians since the speed of adjustment to longrun equilibrium is only 36.8 per cent approximately. It is also a confirmation that life expectancy, per capita income, health expenditure and unemployment rate are cointegrated.

4.4 Diagnostic Test

To confirm the robustness of the model, a diagnostic test was performed as shown in Table 4.4.

Table 4.4: Key Regression and Diagnostic Statistics for the Model

R-squared	0.501806	Mean dependent var	0.188611
Adjusted R-squared	0.414090	S.D. dependent var	0.258149
S.E. of regression	0.259961	Akaike info criterion	13.27167
Sum squared resid	2.094974	Schwarz criterion	13.27167
Log likelihood	20.09809	Hannan-Quinn criter.	13.40016
F-statistic	48.28691	Durbin-Watson stat	1.907702
Prob(F-statistics)	0.000000		

Source: Author's compilation with information from ECM results

The coefficient of determination R^2 indicates that 50.2 per cent of the total variation of life expectancy of Nigerians is jointly explained by per capita income, health expenditure and unemployment rate. The Akaike information criterion, Schwarz criterion and Hannan-Quinn criterion shows that the model is correctly specified. F statistic measuring the joint significance of all regressors in the model is statistically significant at the 5 per cent level. Similarly, the Durbin-Watson statistic of 1.907702 confirm that autocorrelation problem is eliminated.

Stability Test

Stability test was conducted using Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUM Q) of recursive residuals as shown in figures 4.1a and 4.1b below.

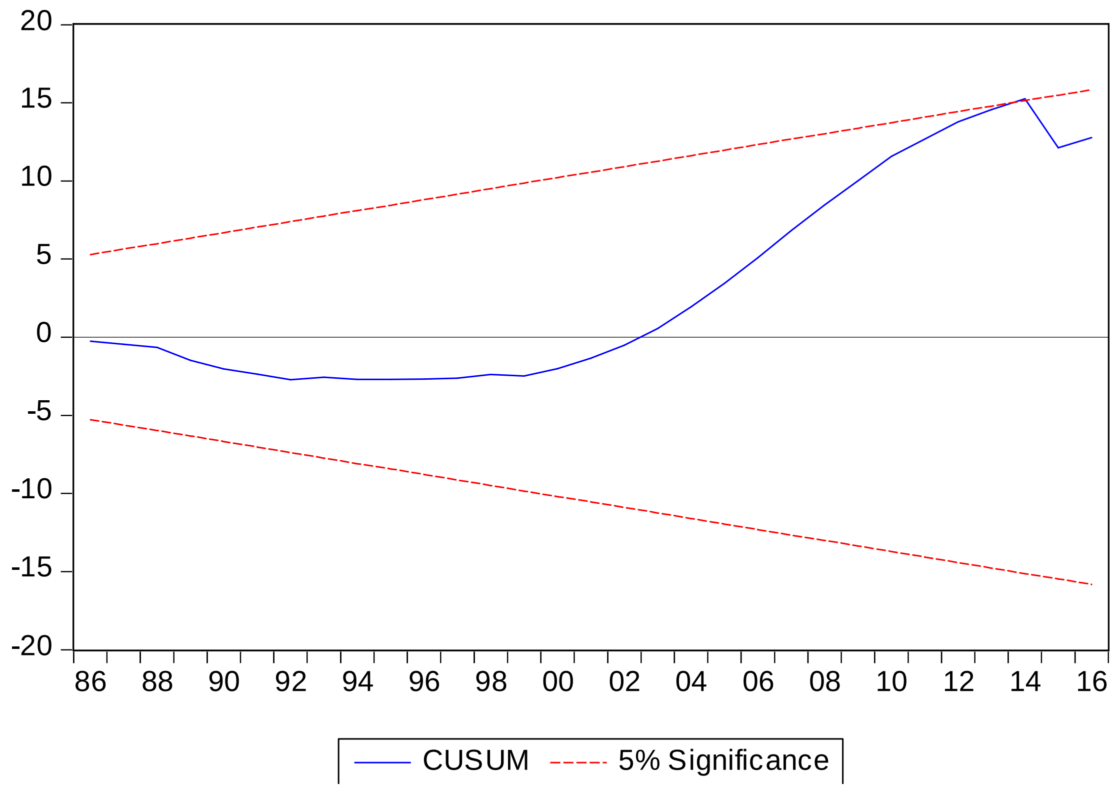

Fig.4.1a: Plot of Cumulative Sum of Recursive Residuals

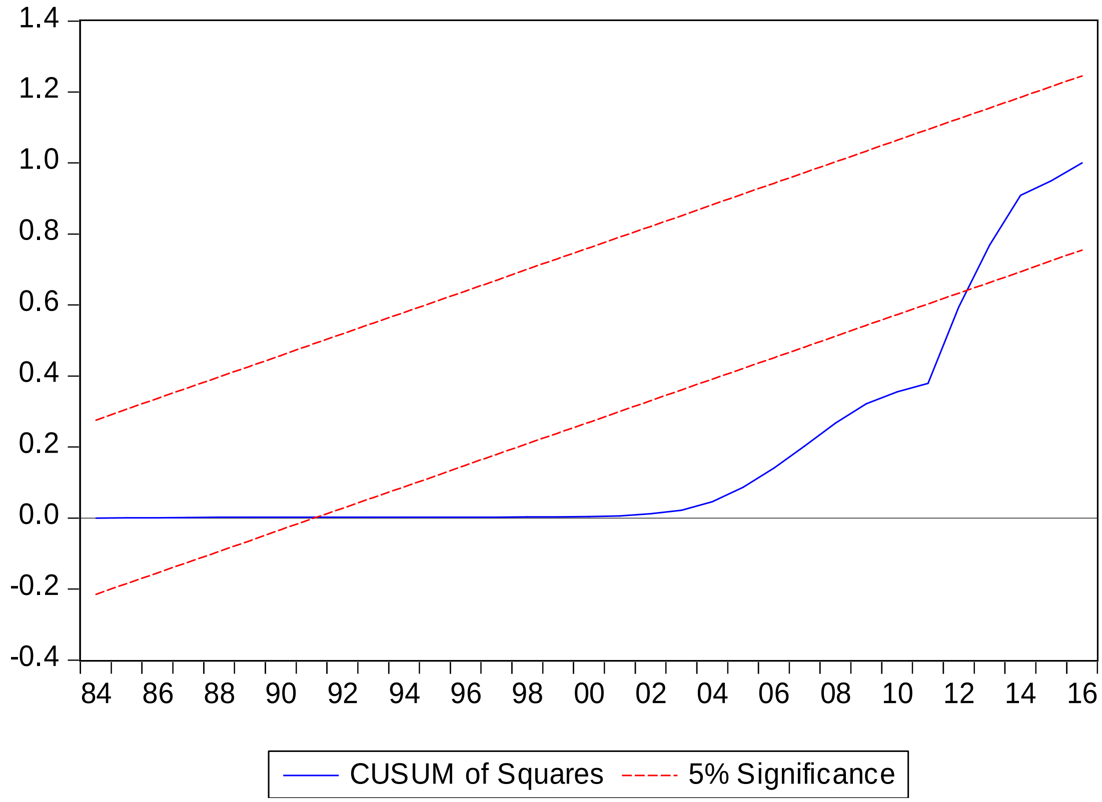

Fig.4.1b: Plot of Cumulative Sum of Square of Recursive Residuals

The existence of parameter instability is established if the cumulative sum of square of the residual goes outside the area between the critical (straight bounded upper and lower) lines. From figure 4.1a and 4.1b above, it was observed that the model at 5 per cent level of significance, CUSUM and CUSUM Q are both stable over time because the observed bound lied between the upper and lower limit. In conclusion, at 5 per cent critical value both CUSUM and CUSUM Q of recursive residual are good enough to explain the stability of the data overtime.

5.0 Concluding Remarks

In reviewing the impact of Per Capita Income on Health Outcome in Nigeria between 1980 and 2016, one can deduce from the findings that the significant impact of Health Expenditure (HE) on Life Expectancy is as a result of heavy participations of both private and government investors in health facilities in Nigeria to reduce infant mortality rate, infections, diseases and increases life span of average Nigerian within the period.

The empirical investigation on the impact of Per Capita Income and Health Outcome in Nigeria spanning 1980 to 2016, confirmed the stationarity of the selected macroeconomic and health variables at first difference 1(1). The Johansen cointegration test indicates a unique longrun relationship between the selected macroeconomic and health indicators while the error correction model shows a slow adjustment process in the Life Expectancyof Nigerians since the speed of adjustment to longrun equilibrium is below 50 per cent. It is also a confirmation that indeed Life Expectancy, Per Capita Income, Health Expenditure and Unemployment rate are cointegrated.

5.1 Recommendations

The following recommendations are made from the study:

i. Government should make strong HealthPolicy that will give weight to health facilities in Nigeria to compete favourably with the international world.

ii. The federal government should make Macroeconomic Policy that will reduce Unemployment rate in Nigeria to enable both lower and middle class citizens to access health facilities in Nigeria thereby increases life expectancy in the country.

iii. Government at all levels should increase their budgets on health sector to enable a geometric spread of modern health facilities in Nigeria.

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Appendix A: Unit Root Test Results

Null Hypothesis: LE has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.236773	0.0264
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LE)
Method: Least Squares
Date: 05/04/18 Time: 12:25
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LE(-1)	-0.073413	0.022681	-3.236773	0.0029
C	3.391301	1.046400	3.240921	0.0029

R-squared	0.618689	Mean dependent var	0.184118
Adjusted R-squared	0.580558	S.D. dependent var	0.265011
S.E. of regression	0.171633	Akaike info criterion	-0.576788
Sum squared resid	0.883735	Schwarz criterion	-0.397216
Log likelihood	13.80539	Hannan-Quinn criter.	-0.515548
F-statistic	16.22533	Durbin-Watson stat	1.696348
Prob(F-statistic)	0.000002		

Null Hypothesis: D(LE) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.520340	0.5110
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LE,2)
Method: Least Squares
Date: 05/04/18 Time: 12:58
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LE(-1))	-0.210590	0.138515	-1.520340	0.1393
C	0.017390	0.041125	0.422864	0.6755

R-squared	0.571310	Mean dependent var	0.003333
Adjusted R-squared	0.526963	S.D. dependent var	0.246331
S.E. of regression	0.169421	Akaike info criterion	-0.599647
Sum squared resid	0.832401	Schwarz criterion	-0.418252
Log likelihood	13.89418	Hannan-Quinn criter.	-0.538613
F-statistic	12.88267	Durbin-Watson stat	2.057020
Prob(F-statistic)	0.000016		

Null Hypothesis: PCI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.901440	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PCI)
Method: Least Squares
Date: 05/04/18 Time: 12:59
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PCI(-1)	-0.711561	0.079938	-8.901440	0.0000
C	8.801412	0.995943	8.837262	0.0000

R-squared	0.699741	Mean dependent var	-0.057188
Adjusted R-squared	0.690910	S.D. dependent var	0.418730
S.E. of regression	0.232797	Akaike info criterion	-0.023351
Sum squared resid	1.842604	Schwarz criterion	0.064622
Log likelihood	2.420315	Hannan-Quinn criter.	0.007354
F-statistic	79.23564	Durbin-Watson stat	0.322681
Prob(F-statistic)	0.000000		

Null Hypothesis: D(PCI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-36.77044	0.0001
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PCI,2)
Method: Least Squares
Date: 05/04/18 Time: 13:01
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PCI(-1))	-0.974404	0.026500	-36.77044	0.0000
C	0.013253	0.011202	1.183094	0.2452

R-squared	0.976174	Mean dependent var	0.069920
Adjusted R-squared	0.975452	S.D. dependent var	0.418950
S.E. of regression	0.065640	Akaike info criterion	-2.553826
Sum squared resid	0.142183	Schwarz criterion	-2.464949
Log likelihood	46.69195	Hannan-Quinn criter.	-2.523145
F-statistic	1352.065	Durbin-Watson stat	1.605438

Null Hypothesis: HE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.372363	0.9032
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HE)
Method: Least Squares
Date: 05/04/18 Time: 13:01
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HE(-1)	-0.013793	0.037042	-0.372363	0.7121
C	0.368244	0.347682	1.059140	0.2975

R-squared	0.101976	Mean dependent var	0.184459
Adjusted R-squared	0.045849	S.D. dependent var	0.607857
S.E. of regression	0.593759	Akaike info criterion	1.877129
Sum squared resid	11.28158	Schwarz criterion	2.010444
Log likelihood	-29.84975	Hannan-Quinn criter.	1.923149
F-statistic	1.816892	Durbin-Watson stat	2.001665
Prob(F-statistic)	0.178899		

Null Hypothesis: D(HE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.912464	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HE,2)
Method: Least Squares
Date: 05/04/18 Time: 13:04
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HE(-1))	-1.314789	0.166167	-7.912464	0.0000
C	0.244877	0.104053	2.353382	0.0247

R-squared	0.654837	Mean dependent var	-0.007471
Adjusted R-squared	0.644378	S.D. dependent var	0.982590
S.E. of regression	0.585958	Akaike info criterion	1.824309
Sum squared resid	11.33046	Schwarz criterion	1.913186
Log likelihood	-29.92541	Hannan-Quinn criter.	1.854990
F-statistic	62.60708	Durbin-Watson stat	2.003983
Prob(F-statistic)	0.000000		

Null Hypothesis: UR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.111453	0.2415
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UR)
Method: Least Squares
Date: 05/04/18 Time: 13:05
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UR(-1)	-0.230403	0.109121	-2.111453	0.0422
C	1.996192	1.131176	1.764705	0.0866

R-squared	0.115924	Mean dependent var	0.016389
Adjusted R-squared	0.089922	S.D. dependent var	3.979645
S.E. of regression	3.796503	Akaike info criterion	5.559990
Sum squared resid	490.0568	Schwarz criterion	5.647964
Log likelihood	-98.07983	Hannan-Quinn criter.	5.590695
F-statistic	4.458235	Durbin-Watson stat	2.045168
Prob(F-statistic)	0.042162		

Null Hypothesis: D(UR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.616112	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UR,2)
Method: Least Squares
Date: 05/04/18 Time: 13:06
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UR(-1))	-1.142837	0.172735	-6.616112	0.0000
C	0.017021	0.685701	0.024823	0.9803

R-squared	0.570161	Mean dependent var	0.052286
Adjusted R-squared	0.557136	S.D. dependent var	6.095650
S.E. of regression	4.056537	Akaike info criterion	5.693981
Sum squared resid	543.0312	Schwarz criterion	5.782858
Log likelihood	-97.64468	Hannan-Quinn criter.	5.724662
F-statistic	43.77294	Durbin-Watson stat	1.978166
Prob(F-statistic)	0.000000		

Appendix B: Results of the Unrestricted Cointegration Rank Test

Date: 05/04/18 Time: 13:06
Sample (adjusted): 1982 2016
Included observations: 35 after adjustments
Trend assumption: Linear deterministic trend
Series: LE PCI HE UR
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.586235	52.16239	47.85613	0.0187
At most 1	0.310325	21.27636	29.79707	0.3406
At most 2	0.193091	8.272630	15.49471	0.4367
At most 3	0.021580	0.763558	3.841466	0.3822

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.586235	30.88603	27.58434	0.0181
At most 1	0.310325	13.00373	21.13162	0.4519
At most 2	0.193091	7.509072	14.26460	0.4308
At most 3	0.021580	0.763558	3.841466	0.3822

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LE	PCI	HE	UR
-1.463151	10.44752	0.340527	0.201858
-0.879631	10.11075	-0.208119	-0.093360
-0.955040	3.051781	0.705199	-0.165416
0.434031	0.035002	0.131890	-0.125536

Unrestricted Adjustment Coefficients (alpha):

D(LE)	0.138993	-0.038039	0.033083	-0.002553
D(PCI)	-0.006815	-0.031376	0.004833	0.001762
D(HE)	-0.147712	-0.102514	0.033684	-0.069315
D(UR)	-0.625638	0.652856	1.580334	-0.000178

1 Cointegrating Equation(s):	Log likelihood	-53.05658

Normalized cointegrating coefficients (standard error in parentheses)

LE	PCI	HE	UR
1.000000	-7.140423	-0.232735	-0.137961
	(0.65775)	(0.07215)	(0.03191)

Adjustment coefficients (standard error in parentheses)

D(LE)	-0.203367
	(0.04233)
D(PCI)	0.009971
	(0.01600)
D(HE)	0.216125
	(0.14320)
D(UR)	0.915403
	(1.03759)

2 Cointegrating Equation(s): Log likelihood -46.55471

Normalized cointegrating coefficients (standard error in parentheses)

LE	PCI	HE	UR
1.000000	0.000000	-1.002448	-0.538281
		(0.30566)	(0.17578)
0.000000	1.000000	-0.107797	-0.056064
		(0.03968)	(0.02282)

Adjustment coefficients (standard error in parentheses)

D(LE)	-0.169907	1.067528
	(0.04789)	(0.40785)
D(PCI)	0.037570	-0.388435
	(0.01580)	(0.13460)
D(HE)	0.306299	-2.579710
	(0.16389)	(1.39575)
D(UR)	0.341130	0.064504
	(1.19284)	(10.1584)

3 Cointegrating Equation(s): Log likelihood -42.80018

Normalized cointegrating coefficients (standard error in parentheses)

LE	PCI	HE	UR
1.000000	0.000000	0.000000	-7.175001
			(1.82368)
0.000000	1.000000	0.000000	-0.769732
			(0.19809)
0.000000	0.000000	1.000000	-6.620511
			(1.71535)

Adjustment coefficients (standard error in parentheses)

D(LE)	-0.201502	1.168489	0.078577
	(0.05354)	(0.40662)	(0.02218)
D(PCI)	0.032955	-0.373687	0.007617
	(0.01802)	(0.13688)	(0.00747)
D(HE)	0.274129	-2.476914	-0.005211
	(0.18740)	(1.42313)	(0.07762)
D(UR)	-1.168153	4.887336	0.765531
	(1.24040)	(9.41987)	(0.51380)

Appendix C: Results of the Error Correction Model

Dependent Variable: D(LE)
Method: Least Squares
Date: 05/04/18 Time: 09:28
Sample (adjusted): 1981 2016
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.195199	0.045843	4.257947	0.0002
D(PCI)	0.055935	0.110479	0.506297	0.6162
D(HE)	0.564923	0.098501	5.735201	0.0001
D(UR)	-0.136105	0.137110	-0.992670	0.8783
ECM(-1)	-0.368047	0.337504	-1.090496	0.0079

R-squared	0.501806	Mean dependent var	0.188611
Adjusted R-squared	0.414090	S.D. dependent var	0.258149
S.E. of regression	0.259961	Akaike info criterion	13.27167
Sum squared resid	2.094974	Schwarz criterion	13.27167
Log likelihood	20.09809	Hannan-Quinn criter.	13.40016
F-statistic	48.28691	Durbin-Watson stat	1.907702
Prob(F-statistic)	0.000000		

Appendix D: Macroeconomic and Health indicators

YEAR	Per Capita Income (PCI) ₦'Billion	Health Expenditure (HE) ₦'Billion	UnemploymentRate (UR) Percentage	Life Expectancy (LE) Years
1980	293200.62	360.94	5.36	45.55
1981	247876.91	388.96	5.20	45.85
1982	238954.83	219.35	4.30	46.08
1983	221196.51	175.79	6.40	46.24
1984	211302.78	136.15	6.20	46.32
1985	223088.31	191.12	6.10	46.35
1986	198319.65	199.32	5.30	46.32
1987	172402.73	100.51	7.00	46.26
1988	180584.49	578.20	5.10	46.2
1989	187298.50	796.80	4.50	46.15
1990	205824.65	823.20	3.50	46.11
1991	199405.87	771.30	3.10	46.09
1992	195279.48	394.26	3.50	46.07
1993	194427.76	4113.2	3.40	46.07
1994	191358.15	2843.48	3.20	46.09
1995	186068.96	4633.00	1.90	46.11
1996	190545.72	4683.31	2.80	46.16
1997	191055.15	6514.90	3.40	46.22
1998	191397.69	13049.47	3.50	46.32
1999	187546.07	24025.57	17.50	46.44
2000	192616.38	24083.68	13.10	46.62
2001	196104.41	44650.27	13.60	46.88
2002	198437.81	53229.42	12.60	47.22
2003	213475.69	39698.98	14.80	47.64
2004	278248.99	52406.08	13.40	48.13
2005	280457.09	77463.00	11.90	48.67
2006	295636.12	94453.62	12.30	49.24
2007	307593.63	178809.37	12.70	49.81
2008	318307.75	195419.32	14.90	50.36
2009	331407.66	142700.00	19.70	50.87
2010	347934.39	134100.00	21.40	51.33
2011	355255.02	271300.00	23.90	51.74
2012	360615.22	242900.00	7.60	52.11
2013	370004.25	212386.93	7.10	52.44
2014	383023.42	236676.78	4.80	52.75
2015	382985.41	298420.00	4.28	52.07
2016	374157.05	247595.92	5.95	52.34