International Journal of Operational Research in Management, Social Sciences & Education | IJORMSSE
p-ISSN: 2536-6521 | e-ISSN: 2536-653X
Volume 9 Number 2 July, 2023

Relationship Between Selected Health Indicators and Human Development in Nigeria

[1]Ogwuche David D., [2]Awujola Abayomi & [3]Beke Adewale Jethro,
[1,2&3]Department of Economics,
Bingham University Nigeria

Article DOI: 10.48028/iiprds/ijormsse.v9.i2.10

Abstract

The challenges such as poor services, being faced by the Nigerian Health Sector has motivated this research and the issues of the performances of the sector in recent time. The paper employs the ARDL (Autoregressive Distributed Lag) bounds test approach to cointegration and error correction analysis to investigate the long run and short run relationship of health indicators (capital health expenditure, recurrent health expenditure and life expectancy rate) on human development index in Nigeria from 1990 to 2021. The empirical evidence validates the Mushkin's health-led growth hypothesis as total expenditure on health is observed to have had positive and no significant long-run and short-run effects on the economy. Evidence from the analysis is that both recurrent health expenditure and life expectancy rate impact on Human Development Index (HDI) in the long run, but capital and recurrent health expenditure negatively impact HDI in the short run. However, life expectancy is positive and highly significant in the short run. The paper recommends, inter alia, monitoring of the budgetary allocation to the health sector in order to address the prevalent corruption in the industry and to enhance its contribution to the human development index. It also recommends more training opportunities and improvement on the welfare of the people.

Keywords*: Life Expectancy Rate, Human Development Index, Bounds Test, Capital Health Expenditure, Recurrent Health Expenditure***.**

Corresponding Author: **Ogwuche David D.**

Background to the Study

The relationship that exists between health and human development index has received great and tremendous attention in the academic, other related fields and global literatures. The impact, influence and the significance of health, maternal health and many other indicators in achieving sustainable socio-economic growth has also been established and well documented in literature. A lot of theories suggest the role of gross domestic product as a factor to determine development in the economy. Health just like education plays a vital role in the development of human capital (Aigbedion, Anyanwu & Aiyedogbon, 2015). However, the widely proclaimed economic view of human capital encompasses education, health, training, migration, and other investments that promotes an individual's productivity. Outcomes from various research had proven that there is a positive correlation between health outcomes and sustainable growth in any organized economy. The general acceptance of this nexus motivated the popularity of health outcomes in the Millennium Development Goals (MDGs). It is a statement of fact that three of the goals are health focused while others could be taken as health enhancing.

Over the years, impact of human capital formation, especially health status is realized to be an important predictor of economic growth not only in individual countries but across countries and over time [Bhargava, 2001; Webber, 2002; Alderman, et al, 2003 and Muysken, 2003]. Consequently, health and its likely impact on individual's well-being and on economic growth have received immense importance at various levels [Frank & Mustard, 1994]. The availability of healthcare services and the physical, biological, epidemiological and socio-economic environment in which a person lives, broadly determines the disease pattern, health status and generally the quality of life which reflects on the welfare of an individual. This means that if a country wants to develop successfully economically, a fair amount of money should be spent on healthcare. Government intervention in undertaking fundamental role of allocation, distribution, stabilization and regulation has been encouraged in this regard, especially where or when market proves inefficient. Nigeria still has one of the highest infant mortality rates and low life expectancy when compared with other developing countries.

Irrespective of the budget allocation to the health sector over the years and goals of the current national policy on health, a critical look at the trends of budgetary allocations over the years shows that the federal government has been allocating funds into the health sector. For instance, in year 2023 Nigeria's health budget increased by 339.19% from N278.31bn in 2015 to N1179tn in 2023. This clearly indicates a lot is being channeled to the health sector. The question is how effective has this budgeted amount impacted the healthcare industry? According to Economic Intelligence Global Healthcare outlook (EIU 2023), the (covid-19) pandemic forced governments of nations to spend heavily on rolling out vaccination programmes and investing in healthcare infrastructure and staffing. However, government plans to maintain or increase spending in order to tackle a backlog of non-covid care and resolve staffing issues have been upended by the global economic slowdown. EIU expects total healthcare spending (public and private combined) to rise by 4.9% in nominal US-dollar terms in 2023, this to be propelled by

higher costs and wages. However, spending will fall in real terms as it fails to keep pace with inflation. EIU (2023), estimate that there would have been a similar pattern in 2022, meaning that 2023 will be the second successive year of real terms funding declines. This scenario caught across continents and the impact of this is part of what this paper attempts to look into, i.e. the impacts of these indicators on human development as it affects Nigeria.

Material and Methods

Conceptual Review

Human Development Index

According to UNDP (2022), the Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. It is the geometric mean of normalized indices for each of the three dimensions stated. Human Development is a critical aspect of a fully developed state in all ramifications. Ene (2020) mentioned Omolara (2017) citing Ranis (2004) argued that for long term development to be achieved, Human Development is a necessary prerequisite. A country with high physical growth which is not followed by high levels in Human Development will one day find out that their growth will eventually be unsustainable. The view of achieving growth first ad worry about human development later is one of the major flaws many developing countries of the world still follow. Omolara (2017) opined that the continuous improvement in education, health and the living standard should be a priority to policy makers. Osmani (2016), concept of Human Development which focuses on Human capability. The author wrote that increasing the extent at which citizens can improve. Sen (2016) also wrote that human development is the rate at which the citizens of a country can get or have access to things of value. Every human being should be given the same opportunity and platform to enjoy life of value.

Omolara (2017), human health dimension is assessed by life expectancy at birth, the education dimension is measured by mean of years of schooling for adults aged 25 years or more and the expected years of schooling for children of school entering age. The standard of living dimension is measured by gross national income per capita in a country. The HDI uses the logarithm of income. This is to reflect the diminishing importance of income with increasing GNI. The scores for the three HDI dimension indices are thereby aggregated into a composite index using geometric mean. The HDI is an instrument which can be used to question national policy choices, used to ask how two countries with the same level of GNI per capita can end up with different human development outcomes. This contrasting evidence can stimulate debate about government policy and priorities. The HDI simplifies and captures only part of what human development means. It however does not have any sort of reflection on inequalities, poverty, human security, empowerment, etc. WHO (2021), The HDI is a summary composite measure of a country's average achievements in three basic aspects of human development which are: health, knowledge and standard of living.

Health Indicator

According to Pan American Health Organization, a health indicator is "a construct of public health surveillance that defines a measure of health (i.e., the occurrence of a disease or other health-related event) or a factor associated with health (i.e., health status or other risk factor) among a specified population. Some known health indicators are Crude death rate, Life expectancy, Infant mortality rate, maternal mortality rate, Health Expenditures, Per Capita Income, Poverty status, Food Insecurity, Foreign Direct Investment and so on.

Public Health Expenditure

Eneisik (2021), Public health expenditure is the total amount of fund invested by the public the government that is, central, state and local government. The amount incurred by the government is for the purpose of maintaining the public services and also providing basic goods and services for the people in order to improve social welfare. Public health expenditure is categorized into various categories namely the capital health expenditure and recurrent health expenditure, the developmental and non-developmental expenditure. We also have planned and un-planned expenditure. The capital expenditure is the fund invested by the government on building durable assets, it is non-recurring in nature, but this expenditure is cost incurred by government in building fixed assets such as hospitals, health equipment and machineries. However, recurrent expenditure is that expenditure incurred by the government periodically, such as weekly, monthly quarterly etc. It is also called consumption expenditure (i.e expenses on drugs, salaries of health staff etc).

Another classification of public health expenditure is focused on developmental and non-developmental expenditure and this expenditure depends on whether a particular expenditure by the government enhances development or not. The developmental expenditure are expenses made by the government to promote economic growth. This expenditure includes those on fixed and durable assets, such as building of clinics or dispensaries and purchases of medical equipment to operate the healthcare facilities. Non-developmental expenditure are funds on public debt, salaries of health service providers and purchases of drugs and other consumables. Finally, public health expenditure could also be categorized into planned and un-planned expenditure. The planned expenditure is of the nature of capital expenditure while the un-planned expenditure falls under the category of recurrent expenditure. The unplanned expenditures are the general services such as health and education. This expenditure includes cost of drugs and salaries of healthcare workers. However, expenditure on hospital, clinic buildings and purchases of machineries and equipment are also classified under capital expenditure.

Damian (2014), health expenditure involves all expenditures for the provision of healthcare services, family planning activities, nutrition activities and emergency related services and aids that are budgeted for health care in any system. Mushkin (1962), financing of healthcare services is a very critical component of health system. The annual

budget of the nation provides for health accounts which captures indicators based on information about expenditure collected within an internationally recognized framework. These financial records are a synthesis of the financing and expenditure flows recorded in a health system's operation. This is from funding sources to the distribution of funds between providers and the various functions of health institutions.

Life Expectancy

Hiam et al (2021) life expectancy, shows the estimate of the average number of additional years that a person of a given age can expect to live. The most common measure of life expectancy is life expectancy at birth. The assumption is that the age-specific death rates for the year in question will apply throughout the lifetime of every individual born annually. The estimate, as a matter of fact, gives a projection of the age-specific mortality rates for a given period over the entire lifetime of the population born or alive during that time in focus. The measure also differs considerably by sex, age, race, and by geographic location. Therefore, life expectancy is commonly given for specific categories, rather than for the entire population. Life expectancy shows a reflection of local conditions among people. For instance, in developing countries, life expectancy at birth is relatively low, as against its comparism with the developed countries. In some developing countries, life expectancy at birth may be lower than life expectancy at age 1, probably as a result of high infant mortality rates which are those common ones as a result of infectious disease or lack of access to portable water supply.

Hiam et al (2021), the effectiveness of the estimated life expectancy is subject to the potential accuracy of estimated life expectancy. This, however, depends on the completeness of the data available for the population in question and this data also varies from one country to another. For instance, in the United States of America, the official complete life tables based on documented deaths that have been prepared since 1900. Another more prominent life expectancy calculation is healthy life expectancy or the disability-free life expectancy. This is calculated as the average number of years a person is expected to live in good and sound health, or without disability, when given the current age-specific mortality rates, diseases and disability prevalence rates.

Empirical Review

Eneisik (2021), empirically investigated the relationship between public expenditure and human capital development in Nigeria, evidence from 1960 to 2019. He used the Ordinary Least Square to test the hypothesis. The finding revealed that public education expenditure had significant impact on human development index. Evidence also shows that public health expenditure had positive significant impact on human development index. Empirical evidence further revealed that jointly health and education expenditure have a positive but insignificant impact on human development index in Nigeria. While Aigbedion (2020), empirically examine the impact of health expenditure on human development in Nigeria using time-series data and the study employed the Autoregressive Distributed Lagged (ARDL) and Error Correction Model (ECM) to estimate and analyze the long and short-run impact of government health expenditure

on human development in Nigeria. From the ARDL long-run result, it was revealed that government health expenditure has a positive impact on human development in Nigeria, but the coefficients show that the impact was statistically insignificant. While ECM results revealed that all the independent variables were positively related to human development in Nigeria except the government total health expenditure which is negatively related to human development in Nigeria.

Samuel and Ngozi (2019), researched into government educational expenditure and human capital development in West African countries. Outcome arrived at indicated an increase government education and health expenditure have positive and significant impact on primary and secondary school enrolment. The result of the Granger causality which was used reveals that there is bidirectional causality between government health expenditure and primary as well as secondary school enrolment. The result also revealed that there is bidirectional causality between government educational expenditure and secondary school enrolment. While Oladele and Aigbedion (2018) examined the impact of public health expenditure on economic growth in Nigeria from 1986-2014. Ordinary Least Squares (OLS) and Error Correction Model (ECM) was used to estimate the long-run and short-run impact of public health expenditure on economic growth in Nigeria. The OLS regression result reveals that there is a positive relationship between public health expenditure and economic growth in Nigeria in the long run. Also, the Error Correction Model (ECM) result reveals that public health expenditure has a short-run positive relationship with economic growth in Nigeria. It simply indicates that the health sector has high capacity to enhance economic growth in Nigeria, but government health expenditure and per capita income have infinitesimal or no significant impact on economic growth in Nigeria.

Ogbonnaya (2017), carried out an empirical investigation of the relationship between government human capital spending and human capital development: Evidence from Nigeria 1990-2015. The methodology applied autoregressive distributed lag methods. The result showed that both in the short and long run government health spending impact positively through to a large extent, but insignificant, on human capital development in Nigeria, but not so in terms of government education spending. This give accounts for the low human development index of Nigeria. While Paul & Akindele (2016), also investigated the impact of human capital development in economic growth in Nigeria. The study applied the ADRL-Co-integration analysis to estimate the relationship among the variables of study. Findings from the research showed that there is positive long-run relationship among secondary school enrolment, public expenditure in education, life expectancy rate, gross capital formation and economic growth, however, it is statistically insignificant. The outcome also revealed that there is negative long-run relationship among primary, tertiary school enrolment, public expenditure on health and economic growth.

Anyanwu, Adam, Obi & Yelwa (2015), studied human capital development and economic growth in Nigeria. The study examined the relationship between human

capital and economic growth in Nigeria with time series data which covers periods 1981-2010. The adopted the endogenous modeling approach with the use of autoregressive distributed lag (ARDL) framework. The bounds test analysis indicated the existence of co integration between economic growth and human capital development indicators. The result further showed that human capital development indicators have positive impact on economic growth in Nigeria within the period under study. This study also did examine the long run and short run relationships of government expenditure on human capital development. The study though published in 2015, has a time lag of 4 years and thus does not reflect the current effect of the relationship between government expenditure and economic growth in Nigeria.

Gebrehiwot (2015) examined the impact of human capital development on economic growth in Ethiopia: evidence from ARDL approach to co-integration. The finding of this research revealed that there is a stable long run relationship between real GDP per capita, education human capital, health human capital, labour force, gross capital formation, government expenditure and official development assistance. The analyzed long run model indicates that human capital in the form of health have a positive impact on real GDP per capita. The study however did not examine the long run and short run relationships of government expenditure on human capital development.

Theoretical Framework

Some theories are adopted for this study as highlighted below, however the most appropriate and related theory to this research is the neoclassical growth model. This because it identifies human capital which captures education and health as important factors that determines growth. Keynesian expenditure theory considers government expenditure as a key growth stimulant particular during recession. The Keynesian view is upheld by Ram (1986) through the Ram's Growth Accounting Model, wherein it is shown that government expenditure positively affects growth. Considering that expenditure in health constitutes part of total expenditure, this paper investigates the effect of health expenditure component of total expenditure on economic growth of Nigeria.

The Neoclassical growth models attributed economic growth to capital, labour and technical knowledge. The Augmented Solow Growth Model identifies human capital (education and health) as important factors determining the growth of an economy. Thus the model is also referred to as the Human Capital Augmented Solow Growth Model. Mushkin's (1962) health-led growth hypothesis considers health as a form of capital and sees health expenditure as an investment which can engender increase in income. The study builds on the Augmented Solow Growth model also referred to as the Human capital augmented growth model. This model used is be modified to capture the relationship of health expenditure component of human capital investment to test the validity of Mushkin's hypothesis for Nigeria. The augmented Solow model and Mushkin hypothesis predict positive relationship between human capital and economic growth,

thus underscoring the importance of human capital investment of which health expenditure is a part in the development of all economies.

Methodology

The analysis employs ex-post facto design and a quantitative technique in which econometric tools are used to analyze the data collected from the secondary sources. This is justified on the ground that pre-existing data, which cannot be susceptible to alteration, is used to examine the relationship between health indicators and human development in Nigeria. Data are sourced from the CBN Statistical Bulletin, NBS Data Bank and the World Bank Data Base. The method of analysis adopted for this study is The Autoregressive Distributed Lag (ARDL) based Bounds test approach to cointegration and error correction modeling. The choice of this methodology is informed by the need to investigate the long run and short run relationships between the explanatory variables and the dependent variable. This method of error correction modeling has three distinct advantages over other error correction models. First it is applicable to modeling involving data that are of mixed order of integration; second, it is relatively more efficient in cases of small and finite data sizes and third, it yields unbiased estimates of the long-run model. (Harris & Sollis, 2003).This method involves unit root test for variables using one or more of the unit root test methods (Augmented Dickey Fuller test, Phillips Perron test, etc), the cointegration test which is conducted to test the possibility of existence of level relationship or long run (equilibrium) relationship between the variables (dependent and explanatory variables) and, if the variables are found to be cointegrated, that is if the cointegration test indicates existence of level relationship between the variables, then an error correction model was estimated, as cointegration is a condition for error correction representation according to the Granger Representation Theory. The ADF test adopted to test for unit root entails estimating the regression equation (Gujarati, 2004):

$$\Delta Y = \beta^{1} D_t + \pi Y_{t-1} + \sum_{j=1}^{p} \varphi \Delta Y_{t-1} + \varepsilon t \quad (1)$$

Where $\pi = \phi - 1$ under null hypothesis Δyt is I(0) which implies that $\pi = 0$, D is a vector of deterministic terms (constant, trend), p lagged difference terms, $\Delta yt\text{-}j$, are used to approximate the ARMA structure of the errors, and the value of p is set so that the error εt is serially uncorrelated. The error term is also assumed to be homoscedastic.

Model Specification

This work adopts the model specifications of Eneisik (2021). Thus, the Human Capital Development is a function of public health expenditure (which includes Capital and Recurrent Health Expenditure) with the following model:

HDI = f(PHE)

The structural form of the model is extended and expressed as:

$$HDI = f(CHE, RHE, LER) \quad (2)$$

Where:
HDI = Human Development Index, CHE = Capital Health Expenditure, RHE = Recurrent Health Expenditure, LER = Life Expectancy Rate

Transforming the above equations into true regression form,

$$\text{HDI} = \beta_0 + \beta_1 \Delta\text{CHE} + \beta_2 \Delta\text{RHE} + \beta_3 \Delta\text{LER} + \varepsilon_t (3)$$

The ARDL model of any identify cointegrating vector is re-parameterized into ECM, which result gives short run dynamics and long run relationship of the variables of a single model.

However, when there are multiple cointegrating vector, ARDL approach to cointegration cannot be used. For the sake of this study, the cointegration process pertaining to health indicators, economic development entry starts with the re-modification of equations above into ARDL framework.

$$\Delta logHDI = \beta_0 + \sum_{i=i}^{P} \beta_1 \Delta logHDI_{t-i} + \sum_{i=i}^{Q} \beta_2 \Delta logCHE_{t-i} + \sum_{i=i}^{R} \beta_3 \Delta logRHE_{t-i} + \sum_{i=i}^{S} \beta_4 \Delta LER_{t-i} + \varphi_1 \Delta \text{log} HDI_{t-i} + \varphi_2 \Delta logCHE_{t-i} + \varphi_3 \Delta log\text{RHE}_{t-i} + \varphi_4 \Delta LER_{t-i} (4)$$

Where Δ is the difference operator, while φ is the parameter for the Human Development Index. β_1- β_4 represent the short run parameters, the terms with the summation signs represent the error correction dynamics, and φ_1 - φ_4 are the long run parameters. The cointegration test requires setting up the two hypotheses (null hypotheses against the alternative hypothesis as follows:

$H_0 = \varphi = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$ ..... Null hypothesis
$H_0 = \varphi = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$..... Alternative hypothesis

If the F-statistic is greater than the upper critical bound value, the null hypothesis is rejected confirming the existence of the long run relationship and vice versa. After establishing the long run relationship, the next step is to estimate the long run model started as follows:

$$\Delta logHDI = \beta_0 + \varphi_1 \Delta logHDI_{t-i} + \varphi_2 \Delta logCHE_{t-i} + \varphi_3 \Delta logRHE_{t-i} + \varphi_4 \Delta LER_{t-i} (5)$$

After estimating the ARDL long run specification and the connected long run multipliers, the error correction model need to be estimated too. Thus, the error correction model mainly formulated to estimate the short run dynamics. This is started as follows:

$$\Delta LogHDI = \beta_0 + \sum_{i=i}^{P} \beta_1 \Delta logHDI_{t-i} + \sum_{i=i}^{Q} \beta_2 \Delta log\text{CHE}_{t-i} + \sum_{i=i}^{R} \beta_3 \Delta log\text{RHE}_{t-i} + \sum_{i=i}^{S} \beta_4 \Delta LER_{t-i} + \varphi_1 ECM_{t-i} (6)$$

Where β_1- β_4 represent the short run parameters and φ_1 is the speed of adjustment parameter which is expected to be less than zero. ECM is the lagged error correction term obtained from the estimated cointegration model equation above.

A Priori Expectation
According to economic theory, it is expected that Capital Health Expenditure (CHE), Recurrent Health Expenditure (RHE) and Life Expectancy Ratio (LER) will have a positive impact on the human development index.

Presentation and Discussion of Results
This section shows the presentation of various tests carried out for the research and the analysis of the results obtained.

Descriptive Statistics
This is a glimpse of the data used in terms of distribution of the variables.

Table 1: Descriptive Statistics

	HDI	LER	RHE	CHE
Mean	0.476375	49.2653	114.9371	86.35069
Median	0.4765	48.524	58.97681	70.08076
Maximum	0.538	55.12	423.3298	303.6626
Minimum	0.413	45.841	0.150161	1.4917
Std. Dev.	0.044516	3.286815	129.6805	81.34137
Skewness	0.129222	0.386305	1.00792	0.909218
Kurtosis	1.411862	1.631857	2.829315	3.110349
Jarque-Bera	3.451968	3.291654	5.456988	4.42518
Probability	0.177998	0.192853	0.065318	0.109417
Sum	15.244	1576.49	3677.988	2763.222
Sum Sq. Dev.	0.061432	334.8977	521328.2	205109
Observations	32	32	32	32

Source: Authors Computation using E-view 10, 2023

From table 1, the skewness of the HDI is positive with value of 0.129222which tends towards the right. Also, the LER, RHE and CHE are skewed towards the right because their values are all positive. The kurtosis of a normal distribution is 3. If it exceeds 3 it means the distribution is leptokurtic. On the other hand, if less than 3, it indicates the distribution is platykurtic relative to the normal distribution. From table 1, the kurtosis value of HDI, LER, RHE and CHE which are 1.411862, 1.631857, 2.829315, and 3.110349respectively shows that HDI, LER and RHE are less than 3, and CHE is greater than 3. This means that CHE is leptokurtic, RHE, HDI and LER are platykurtic relative to the normal distribution. For the Jarque-Bera statistics, the Null Hypothesis which states that the distribution is normally distributed is rejected at 5% level of significance. From Table 1, the probability values of the Jarque-Bera show that HDI, LER, RHE and CHE are all normally distributed with their probability values of0.177998,0.192853, 0.065318 and 0.109417respectively.

Unit Root Test Result
The Augmented Dicker-Fuller (ADF) unit root test is used to conduct a pre-diagnostic test to ascertain the underling properties of the time series variables. This test is

important because estimating a model in the presence of non-stationary time series variable usually leads to spurious (meaningless) regression output with biased and inconsistent estimates of the standard errors of the coefficients, which could lead to misleading inference. Table 2 shows the summary of the computed Augmented Dicker Fuller Unit Root test for each of the variables.

Table 2: Summary of Augmented Dicker Fuller Stationarity Test

Variable	ADF Test Statistics	Critical ADF Test Statistics	Probability Value	Order of Integration
HDI	-3.623095	-2.963972	0.0112	I(1)
CHE	-6.705807	-2.963972	0.0000	I(1)
RHE	-4.838153	-2.967767	0.0005	I(1)
LER	-4.850254	-2.991878	0.0007	I(0)

Source: Authors Computation using E-view 10, 2023

From the summary of Table 2, it could be seen that the HDI, CHE and RHE are stationary at first difference while LER is stationary at levels. Based on the combination of the order of integration of I(0) and I(1) without any integrated at I(2), the study proceeded to estimate the variables using the Auto-Regressive Distributive Lag (ARDL) model.

ARDL Bound Test for Cointegration

The bound test is performed to show the levels of Cointegration among the variables. It helps to show if there is a long run relationship among the variables.

Table 3: ARDL Bound Test for Cointegration

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.038787	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.50%	3.69	4.89
		1%	4.29	5.61

Source: Authors Computation using E-view 10, 2023

The bound test null hypothesis states that no level relationship. If the value of the F-statistics is lower than the value of the lower and upper bound, the result showed rejection of the null hypothesis but if it is greater than the lower and the upper bound, the null is rejected and accept the alternate that there is a long run relationship amongst the variables. From table 3, the bounds test value of the F-statistics which is 6.038787is higher than the values of the upper and lower bound limit which are 3.23 and 4.35 at 5% critical level of significance. This means that there is a long run equilibrium relationship between the variables HDI, CHE, RHE and LER. Having established that there is long run relationship between the variables, the next step is estimating the Error Correction Model.

Table 4: Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Long Run Coefficients				
LOG(CHE)	-0.020072	0.010939	-1.834950	0.0895
LOG(RHE)	0.014461	0.009652	1.498305	0.1579
LER	0.020899	0.002887	7.237993	0.0000
C	-1.760753	0.139321	-12.63811	0.0000
Short Run Coefficients				
DLOG(CHE)	-0.003933	0.002807	-1.401431	0.1845
DLOG(RHE)	-0.000583	0.003702	-0.157432	0.8773
D(LER)	0.016215	0.003687	4.398538	0.0007
ECM(-1)*	-0.602580	0.107886	-5.585357	0.0001
R-squared	0.997290			
Adjusted R-squared	0.994371			
F-statistic	341.7013			
Prob(F-statistic)	0.000000			

Source: Authors Computation using E-view 10, 2023

The long-run form of the model in terms of magnitude, the coefficient of CHE which gave a value of -0.020072 which implies capital health expenditure negatively affect HDI. It means for every 1% increase or decrease in PHE will lead to 2% sustained increase or (decrease) in HDI. It will on average, lead to 2 percent increase (or decrease) in HDI. With respect to the coefficient of RHE which gave a value of 0.014461 shows that for every 1 % increase (or decrease) in RHE, will on average lead to 1 percent decrease (or increase) in HDI. Also, with respect to the coefficient of LER which gave a value of 0.020899 shows that for every 1 % increase in LER, will on average lead to 2 percent decrease (or increase) in HDI and highly significant impact.

Error Correction Model (ECM)

Since there is long run relationship among the variables, the ECM was estimated. The Error Correction Model is shown as follows:

$$\Delta logHDI = \beta_0 + \sum_{l=i}^{P} \beta_1 \Delta logHDI_{t-i} + \sum_{l=i}^{Q} \beta_2 \Delta logCHE_{t-i} + \sum_{l=i}^{R} \beta_3 \Delta log\mathrm{RHE}_{t-i} + \sum_{l=i}^{S} \beta_4 \Delta LER_{t-i} + \varphi_1 ECM_{t-i} (7)$$

The Error Correction Model (ECM) shows the short run relationships between the dependent and the independent variables. The Error Correction Term (ECT) must be negative and less than 1 and should be statistically significant. In table 5 the probability value of -0.0602580 of the F-statistics, indicates that there is a short run relationship between the HDI, CHE, RHE and LER. The ECT shows the speed of adjustment from a disequilibrium states. Its value of--0.0602580 indicates that it is negative, less than 1 and statistically significant. This mean that, the speed of adjustment from the short run to the

long run should is 6%. It also means that it will take 6% speed of adjustment for the model to adjust within a year from the short run to the long run. The R-square value of 0.997290 revealed that the CHE, RHE and LER jointly accounted for about 99 percent of the variation in HDI while the remaining 1 percent are accounted for by other factors outside the model.

Table 5: Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.055181	Prob. F(2,14)	0.9465
Obs*R-squared	0.218998	Prob. Chi-Square(2)	0.8963

Sources: Authors Computations using E-views 10, 2023

Serial Correlation Result

In line with the rule of the Breusch-Godfrey Serial Correlation LM Test, the probability value of 0.9465of the F-statistics indicates that the model is free from serial correlation because the probability value is greater than 5%.

Stability Test

A CUSUM test assesses the stability of coefficients whether there is a structural change in a model. The CUSUM chart is shown in Figure 1

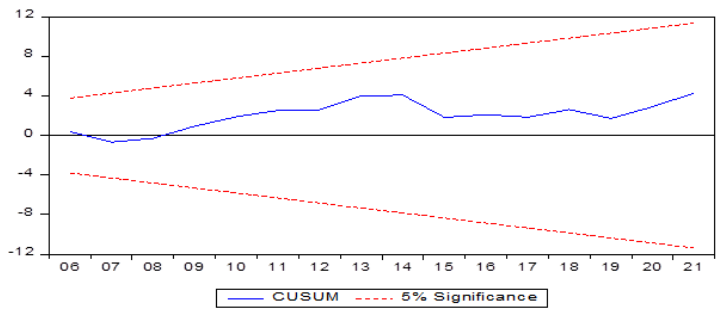
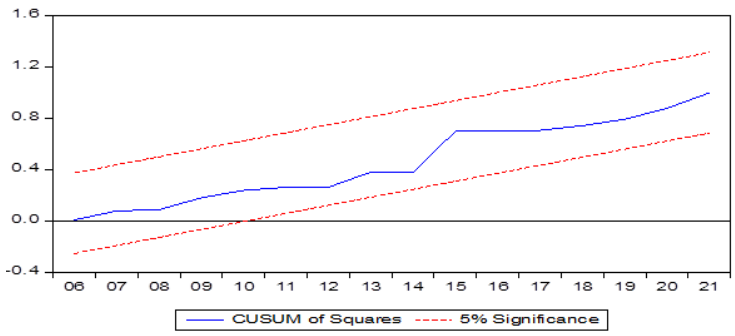


Fig. 1



The null hypothesis for CUSUM test states that the parameters are stable while the alternate hypothesis states that the parameters are not stable. The guideline is that, if the blue line lies within the red line, we accept the null hypothesis that the parameters are stable. On the other hand, if the blue line crosses the red line, we reject the null and accept the alternative hypothesis that the parameters are not stable. From figure 4.1, it could be seen that for both CUSUM AND CUSUM SQ the blue line lies between the two red lines. This means that the model is stable.

Discussion and Implications of Findings

The study attempts to examine the relationship between health indicators and the human development in Nigeria. The study specifically measures the relationship of Capital Health Expenditure, Recurrent Health Expenditure and Life Expectancy on the Human Development both in the short and long run in Nigeria. The study employed the Auto Regressive Distributed Lag tools to test the impact of the variables, while the error correction term (ECM) was used to test the short run impact of health indicators on the human development. Evidence from the analysis is that both recurrent health expenditure and life expectancy rate impact on HDI in the long run, but capital and recurrent health expenditure negatively impacts HDI in the short run. However, life expectancy is positive and highly significant in the short run. This Justifies the work of Aigbedion (2020) which revealed that government health expenditure positively impacts human development in Nigeria.

Conclusions and Recommendations

The paper investigated the relationship between some selected health indicators and human development in Nigeria in the period from 1990 to 2021 using the ARDL-based Bounds test approach to cointegration and error correction. The study finds that health indicators positively and significantly affect human development. The impact of Life expectancy on Human development was found to be positive and highly significant in both short-run and long run. The short-run effect of recurrent health expenditure is negative, but a positive impact in the long run. Further evidence shows a negative impacts of capital health expenditure on human development index.

In light of the empirical evidence, the following are recommended for policy consideration:

i. Government should monitor investment in the health sector. This by ensuring fund allocated is well utilized and channeled to the right capital project. This is in consideration of the observed negative impact of capital health expenditure on the human development.
ii. Considering the fact that recurrent health expenditure positively affected human development in the long run, there is need for the government through its institutions and agencies to put measures on ground to train healthcare workers so as to make them more productive. The human development should emphasize on the needs to efficiently utilize fund that are meant to enhance the service delivery of the health sector. These measures include infrastructural

development, improving the security condition in various remote healthcare facilities, improving on the welfare of health workers.

iii. Government should create policies that will enhance the life expectancy of the people as it has a very positive and highly significant impact at improving the welfare of the people in the short run and long run. This will in the end have a very positive impact on the human development in Nigeria.

References

Aigbedion, I. M. (2020), Impacts of government health expenditure on human development in Nigeria. *Bingham Journal of Economics and Allied Studies (BJEEAS*), 4(1)

Aigbedion, I. M, Anyanwu, O. A., & Aiyedogbon, A. (2015). Impact of health sector public private partnership on effective health care delivery for economic growth in Nigeria: An Error correction model, *International Journal of Advanced Research in Social Engineering and Development Strategies*. 3(1), 31-41.

Aremu, Y. S., Babalola, B.T.A., Aninkan, O. D., & Salako, M. A. (2015). Analysis of impact of sectoral Government expenditures on economic growth in Nigeria: Bound test cointegration approach, *European Journal of Business and Management. 7(12); 1-15.*

Anyanwu, S. O., Adam, J. A., Obi, B., & Yelwa, M., (2015). Human capital development and economic growth in Nigeria, *Journal of Economics and Sustainable Development*, 6(14), 1-12.

Bhatia, H. L. (2002*). Public finance, 25th edition*, India: Vikas Publishing House.

Chappelow, J. (2020). *Guide to Unemployment*. *Investopedia*

Damian, U. & Chukwunonso, E. (2014). Effects of per capita spending on child mortality in Nigeria*, International Journal of Innovative Research and Development,*3(9).

Efobi, U., & Osabuohien, S. E. (2012). Government expenditure in Nigeria: An Examination of Tri-Theoretical Mantras. *Journal of Economic and Social Research* 14(2), 27-52.

Ejere, S. I. (2011). Human capital formation as catalyst for national development: Nigeria in perspective, *International Business and Management*, 2(2), 98-104.

Ene Blessing (2020). Human Development in Nigeria, *International Journal of African and Asian Studies 61*

Eneisik, G (2021). Public expenditure and human capital development in Nigeria, *Journal of Accounting and Financial Management* E-ISSN 2504-8856 P-ISSN 2695-2211 7(2)

Gebrehiwot, K.G. (2015). The impact of human capital development on economic growth in Ethiopia: Evidence from ARDL Approach to Co-Integration, *Journal of Economics and Sustainable Development.* 6(13), 1-15.

Gallardo, G. (2009). The human development index as an effort to measure well-being in Honduras. *The 3rd OECD World Forum on "Statistics, Knowledge and Policy*. Charting Progress, Building Visions, Improving Life.

Hanson, B. (2008). OECD measures on human capital and potential use in educational accounts, *Workshop on the Measurement of Human Capital.*

Harbison, F.H. (1973*). Human resources as the wealth of nations*, New York: Oxford University Press.

Hiam, L, Minton, J, & McKee, M. (2021). What can lifespan variation reveal that life expectancy hides? Comparison of five high-income countries. *Journal of the Royal Society of Medicine*. 114(8), 389-399. doi:10.1177/01410768211011742

Lyakurwa, W. M. (2007). *Human capital and technology for development*, Lesson for Africa AfDB

Mlatsheni, C., & Leibbrandt, M. (2011). Youth unemployment in South Africa: Challenges, concepts and opportunities, *Journal of International Relations and Development*, *14*(1), 118-126.

Nwaeze, C., Njoku, R., & Nwaeze, O. P. (2014). Impact of government expenditure on Nigeria's economic growth (1992 – 2011), *A Multidisciplinary Journal of Global Macro Trends. The Macro Theme Review 3(*7), 1-9.

Oladele, O. A., & Aigbedion, I. M., (2018). Public expenditure and economic growth in Nigeria: An error correction model, *Journal of Economics, Management, and Trade. 21(6), 1-11*

Okojie, C. E. E. (2005). Human capital formation for productivity growth in Nigeria, *Nigerian Economic and Financial Review:* 44-5.

Ohwofasa, B. O., Obeh, O., & Atumah, M. (2012). Impact of government expenditure in education on economic growth in Nigeria, 1986-2011: A parsimonious error correction model, *African Journal of Scientific Research.* 10(1), 1-12.

Paul, A. A., & Akindele, J. O., (2016). The impact of human capital development on economic growth in Nigeria: ARDL approach, *Journal of humanities and Social Science* 3(2), 2279-0812

Pesaran, H., & Shin, Y. (1999). *An autoregressive distributed Lag modeling approach to Cointegration Analysis.* England: Cambridge

Pesaran, H., Shin, Y., & Smith, R. (2001). Bounds testing approaches to the analysis of Level relationships. *Journal of Applied Econometrics*, 16(3); 1924-1996.

Samuel, B. A., & Ngozi, B. E., (2019). Government educational expenditure and human capital development in West African countries. *International journal of research and innovation in social sciences,* 3(5), 50-60.

Todaro, M. P. & Smith, S. C. (2006). *Economic development, 9th edition*, England: Pearson Educational Limited.

Torruam, J. T., & Abur, C. C. (2014). Public expenditure on human capital development as a strategy for economic growth in Nigeria: Application of Co integration and causality test analysis. *International Journal of Research in Humanities and Social Studies* 1 (2),1-10.

www.eiu.com.

APPENDIX 1

Table 6: Data for Analysis

YEARS	HDI	CHE	RHE	LER
1990	0.413	2.096	0.5007	45.898
1991	0.421	1.4917	0.6182	45.873
1992	0.424	2.1326	0.150161	45.855
1993	0.426	3.5753	3.871601	45.843
1994	0.427	4.9944	2.093984	45.841
1995	0.429	9.2156	3.3207	45.852
1996	0.432	8.6562	3.1753	45.877
1997	0.435	6.902	3.891099	45.921
1998	0.434	23.3656	4.742267	45.992
1999	0.437	17.2535	16.63877	46.101
2000	0.438	27.9652	15.21808	46.266
2001	0.44	53.336	24.52227	46.509
2002	0.44	32.4673	40.62142	46.834
2003	0.45	55.736	33.26798	47.24
2004	0.46	30.03252	34.2	47.717
2005	0.47	71.36119	55.7	48.246
2006	0.483	78.68134	62.25362	48.802
2007	0.486	150.8952	81.90937	49.356
2008	0.49	152.1746	98.21932	49.887
2009	0.495	144.9265	90.2	50.385
2010	0.5	151.7745	99.1	50.847
2011	0.51	92.8489	231.8	51.279
2012	0.51	97.4	197.9	51.699
2013	0.52	154.7067	180	52.121
2014	0.53	111.29	195.9768	52.549
2015	0.532	82.97675	257.7	52.985
2016	0.535	68.80033	200.824	53.428
2017	0.537	167.6555	245.188	53.875
2018	0.533	203.4181	296.4428	52.9916
2019	0.534	264.6905	388.3671	54.49
2020	0.538	186.7394	423.3298	54.81
2021	0.535	303.6626	386.2444	55.12