



(RESEARCH ARTICLE)



## Impact of human capital investment on economic growth in Nigeria: Econometric approach of Autoregressive Distributive Lag Model (ARDL)

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### Abstract

The study examined the impact of human capital investment on the economic growth in Nigeria over a period of 1985 to 2021. Specifically, the study sought to: i) determine the impact of government expenditure on education on the economic growth in Nigeria; ii) ascertain the impact of government expenditure on health on the economic growth in Nigeria; iii) evaluate the impact of tertiary school enrolment rate on the economic growth in Nigeria. The variables of the study consist of real Gross domestic Product (RGDP), inflation rate (INFLA), exchange rate (EXCHR), education government expenditure (EGE), health government expenditure (HGE), primary School enrolment rate (PSER), secondary school enrolment rate (SSER) and tertiary school enrolment rate (TSER), child mortality rate (CMR) and life expectancy at birth (LIFE). The data analytical techniques were descriptive Statistics, Augmented Dickey-Fuller Unit Root test and Autoregressive distributive Lag Model. The following are the major findings of the study: i) education expenditure (EGE) had 43% positive and insignificant impact on the economic growth in Nigeria [P-value (0.8508) was greater than its significant value (0.05]; ii) health expenditure (HGE) had 8% positive and insignificant impact on economic growth in Nigeria [P-value (0.1925) was greater than its significant value (0.05]; iii) tertiary school enrolment rate (TSER) had 48% positive and insignificant impact on the economic growth in Nigeria [P-value (0.2660) was greater than its significant value (0.05)]. This study concludes that the human capital investment has positive and insignificant impact on the economic growth in Nigeria. The study recommends that government should start and sustain allocating 20 percent increase of funds to capital expenditure on education to provide facilities such as libraries, laboratory equipment, computers and modern learning equipment. Government should attract international donor agencies like World Bank, United Nations and UNESCO to help and put funds into the educational sector.

**Keywords:** Human Capital Investment; Economic Growth; Autoregressive Distributive Lag Model (ARDL)

### 1. Introduction

Human capital investment through education and health in developed and developing countries have attracted the attention of many economists, researchers and policy makers. The most important variables of human capital development are centered towards investment in the Educational and Health sectors (Amadi & Alolote, 2019). Human capital occupies the crux of endogenous economic growth approach given its ability to create assortment of innovation and education is held as the key to human capital development. Accordingly, there is a preponderance of research acclaiming that human capital stock contributes a significant boost to a country's economic growth (World Health Organization WHO, 2008). Therefore, improvement in education provides a necessary pre-condition to long-term economic growth; albeit numerous findings about the role of education, WHO (2008) highlights that education might not always prove to be a sufficient condition. Given that human capital is the hall-mark of endogenous economic growth theory, many researchers have been investigating how human capital relate to economic growth and/or development;

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some have concentrated on a country evidence whilst others have dwelt on a cross-country evidence (Mamoloko & Ngwakwe, 2019; Mekoro, 2020).

The economic rationale for investing in human capital derives from the belief that human capital plays a key role in economic development. According to Todaro and Smith cited in Muhammad, Abiodun & Manzoor, (2018), human capital must be given direct attention in its own right direction even in economies that are growing rapidly. One of the important point worth to mention is that human capital and capital formation forms the basis for breaking vicious cycle of poverty. It is required to achieve sustainable growth and development in both developed and developing countries. Schultz cited in Muhammad, Abiodun & Manzoor, (2018), one of the early contributors to the study of the importance of human capital, identifies five ways by which human capital can be developed. They are as follows: (i) health facilities and services, broadly conceived to include all expenditures that affect the life expectancy, stamina, strength, vigour and vitality of people, (ii) on-the-job- training, including old type apprenticeships organized by firms, (iii) formally organized education at the elementary, secondary, and higher levels, (iv) study programs for adults that are not organized by firms, including extension programs notably in agriculture, and (v) migration of individuals and families to adjust to changing job opportunities. These ways all seek to make the individual more productive. Investment in health and education (the two components of human capital) thus leads to the development of human capital. The development of human capital transcends mere acquisition of intellectual ability through the education system, or the living of a healthier life through adequate healthcare. It seeks to improve the productivity of the individual and make him/her more useful to society and the economy in general. However, human capital is recognized as a mediator of national development in all countries of the world. The availability of education and health services to people is one of the major ways of improving the quality of human resources. It provides an economy with healthy trained human resources required for economic growth and development. These activities all seek to make the individual more productive. Investment in health and education (the two components of human capital) can lead to the development of human capital. Speaking of which, Jhingan (2005) opines that in its wider sense, investment in human capital means expenditure on health, education and social service in general; and in its narrower sense, it implies expenditure on education and training. Since the major source of an increase in per capita output is an improvement in productivity which is due to an increase in the productive power of human through investment in human capital, it is only proper to say that an increase in human capital investment could improve economic development.

### *Statement of the Problem*

In Nigeria, the rate of illiteracy is very high. Most of the workers are unskilled and they make use of outdated capital equipment and methods of production. World Bank (2004) stated that education can help in human development. In some countries, the duration for children primary school attainment is six years. During the period, the level of knowledge acquired is satisfactory. In Nigeria, there is always a case of insufficient teachers eventually in every level of education to the extent that ratio of pupils to teachers were 37 to 1, and the youth literacy rate was 13% for males and 20% for females up to the late 1990s. In 2002, 33% of the relevant age group attended secondary school and only 4% attended tertiary schools. The low number of students in tertiary school can be easily explained by the fact that spending per student in tertiary schools is 529.8% of the GNP.

Furthermore, public spending on education was only 0.9% of the GNP in 2002 (World Bank, 2004). Funding is the biggest problem confronting Nigeria's education system. The percentage of the budget allocated to education annually is abysmally low. In 2019, only 7.04% was allocated to education. This is far below UNESCO's recommended 15%-26%. Nigeria's educational system is in assorted crises of infrastructural decay, neglect, waste of resources and sordid conditions of service. In 2019, the country has over 10 million out-of-school children. That's the highest in the world. Another 27 million children in school are performing very poorly. Millions of Nigerians are half-educated, and over 60 million – or 30% – are illiterate (Imide & Dania, 2019).

Nigeria cannot fully exploit the abilities and skills of human capital because there is no job opportunity to accommodate the small number skilled workforce. This has mounted the challenge of brain-drain in Nigeria. Thus, Nigeria has become a human capital generating machine for the developed countries (Obeng, 2022). Insufficient funding is the major problem of human capital in Nigeria. This has led to shortage of skilled personnel, unemployment and above all poverty. The motivation for this study was born out of the cognizance that Nigeria has largely neglected human capital investment and there still exists a gap in the literature on the impact of higher education on the economy. This study sought to provide answer on what is the impact of human capital investment on the economic growth in Nigeria.

### *Objectives of the Study*

The broad aim of the study was to examine the impact of human capital investment on the economic growth in Nigeria. The specific objectives were to:

- Determine the impact of government expenditure on education on the economic growth in Nigeria.
  - Ascertain the impact of government expenditure on health on the economic growth in Nigeria.
  - Evaluate the impact of tertiary school enrolment rate on the economic growth in Nigeria.
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## **2. Conceptual Literature**

### **2.1. Human Capital**

Human capital has been recognized globally as one major factor that is responsible for the wealth of a Nation According to Smith (1776), he underlined the importance of “the acquired and useful abilities of all the inhabitants or members of the society” in his works. Romele (2013) defined Human capital as the totality of knowledge and skills which have been accumulated during life, through education, training, and work experience and which influence labour productivity. Onakoya (2013) as cited in Obialor, (2017) described human capital as an important factor used in converting all resources to benefit mankind.

In another dimension, Human capital is represented by the aggregation of investment in activities, such as education, health, on-the-job training and migration that enhance an individual's productivity in the labour market. Frank and Bemanke (2007) as cited in Odonkor, Asiedu-Nketiah, Oyemam & Mohammad, (2021) defines that human capital is ‘an amalgam of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness, and initiative that affect the value of a worker's marginal product’. Therefore, human capital refers to the process of acquiring and increasing the number of people who have the skills, good health, education and experience that are critical for economic development.

### **2.2. Human Capital Investment**

The subject of human capital investment has gained the interest of economist over the years. Human capital means different things to different people, for some, it is about workforce planning while for others, it could mean standard of living and education within a society. Human capital consists of health, education, access to resources, political freedom, guaranteed human rights and self-respect amongst others (Ogunleye, Owolabi, Sanyaolu & Lawal, 2017). Todaro and Smith (2003) defined human capital as education, health and other human capacities that can raise productivity when increased. Since human beings are one of the most important resources available in an economy, investment in them would increase their productive capacity and therefore increase the level of output they can produce in the economy which implies economic growth. Continuous economic growth as well as improved standard of living is termed development. Humanity has been evolving from animal physicality to social vitality and mental individuality, therefore affecting productive capability, adaptability, creativity, and organization of the economy, public policy, social awareness and lifestyle that in all determines sustainability (Ojima & Anyanwu, 2021). Appleton and Teal (1998) cited in Olasinde, (2018) describes health and education as components of human capital that contributes to human welfare. This then creates the two major ways to view human capital investment. The first views human capital as involving just education and increase in knowledge while the second views human capital as involving both education and health of individuals in the society. This study would focus on the second view of human capital investment i.e. the one involving both education and health. Health and education in most countries are subsidized by the state in order to allow for free access to health services and education. These subsidies and payments are forms of investment in human capital.

### **2.3. Economic Growth**

Generally, the concept of economic growth is semantically the mixture of “economic” and “growth”. Economics is the management of the factors of production. And growth is an increase in size, number, value, or strength. But from an economic perspective, “economic” and “growth” are jointly used together to mean a positive change in the standard or quality of life of the people. Rangongo & Ngwakwe, (2019), postulates growth is a steady process which involves raising the level of output of goods and services in the economy. Jhingan (2005), further explained that growth is related to a quantitative sustained increase in a country's per capita output accompanied by an expansion in manpower and volume of trade. This implies that economic growth is the sustained increase in an economy's output followed by other factors that influence growth such as infrastructural development, technological advancement as well as human capital development. Economic growth is the increase in the inflation-adjusted market value of the goods and services produced by an economy over time; it is measured as the percentage rate of increase in the real gross domestic product (IMF, 2012). In the same vein the World Bank (1993), identified economic growth as more rapid output and productivity in growth; and by growth, it, therefore, implies the expansion of a country's potential GDP.

## 2.4. Theoretical Literature

### 2.4.1. Human Capital Theory

Human Capital theory as postulated by Paul Romer (1986) emphasizes how education increases the productivity and efficiency of workers by increasing the level of their cognitive skills. The original idea of human capital can be traced back at least to Adam Smith in the 18th century. The modern theory was popularized by Gary Becker, an economist and Nobel Laureate from the University of Chicago, Jacob Mincer, and Theodore Schultz. As a result of his conceptualization and modeling work using Human Capital as a key factor, the 2018 Nobel Prize for Economics was jointly awarded to Paul Romer, who founded the modern innovation-driven approach to understanding economic growth.

Schultz, (1961) introduced the notion that people who invest in education increase their stock of human capital. Examples of such investments include expenditure on education, on the job training, health, and nutrition. Such expenditures increase future productive capacity at the expense of current consumption. However, the stock of human capital increases only in a period when gross investment exceeds depreciation with a passage of time, with intense use or lack of use. The provision of education is seen as productive investment in human being, an investment which the proponents of human capital theory consider to be equally or even more worthwhile than that of physical capital. In fact, contemporary knowledge in the United States acknowledges that investment in human capital is three times greater than that in physical capital. Human capital theorists have established that basic literacy enhances the productivity of workers in low skill occupations. They further state that an instruction that requires logical or analytical reasoning or provides technical and specialized knowledge, increases the marginal productivity of workers in high-skilled professional positions. It has been proven that the greater the provisions of schooling, the greater the stocks of human capital in the society, and consequently, the greater the increase in national productivity and economic growth.

## 2.5. Empirical Literature

Obeng, (2022) conducted a study to examine impact of human capital, private physical capital, public infrastructure on economic growth in Ghana. Specifically, the sought to examines the effect of human capital, private physical capital and public infrastructure on economic growth and the causality between the variables in Ghana considering two alternative measures of human capital (health and education) and public infrastructure (electricity and telephone subscription). Autoregressive Distributive Lag (ARDL) and pairwise granger causality test was used on annual data for Ghana from 1975 to 2017. The empirical results show that, in the short run, the individual measures of human capital (education and health) and public infrastructure (electricity) have positive and significant effects on economic growth. The composite human capital has positive and significant effects on economic growth in the short run. However, in the long run, composite human capital, composite public infrastructure and physical capital do not have significant effect on economic growth. Unidirectional causality was found between human capital (education and health) and economic growth, bidirectional causality between private physical capital and economic growth and unidirectional causality between public infrastructure (electricity) and economic growth. No causality was found between public infrastructure (telephone subscription) and economic growth in Ghana. It is recommended government improves human capital development and find lasting solution to Ghana's infrastructure challenges.

Odonkor, Asiedu-Nketiah, Oyemam and Mohammad, (2021) conducted to investigate the impact of human capital on economic growth in West Africa, specifically Ghana over a period of 40 years. The researcher used secondary data on human capital development and economic growth that was extracted from the economic data of Ghana Statistical Service, the World Bank, journals of economic studies and the Bank of Ghana Research Unit. The researcher applied ordinary least squares regression to estimate the models and also perform data analysis. In the end, it was found out that human capital whether it is developed or under developed has a tremendous impact on the growth of an economy both in the short and long term. The finding of this study reveals that human capital development has significant impact on economic growth in West Africa, specifically Ghana. The study recommended that government should establish special agencies with the obligation of improving the skills and capabilities of students (labours) across all educational levels of the federation so as to sustain long-run economic growth. Secondly, efforts should be geared towards improving education and health sector in terms of increased governmental budgetary allocation for continuous growth sustainability.

Anderu, (2021) conducted an empirically study to examine the nexus between human capital and economic growth in Nigeria between 1981 and 2017. Specifically, the study sought to analyse the impact of education and health (human capital) on economic growth from 1980-2013 in Nigeria. Human capital stock is proxied by primary, secondary and tertiary school enrolment. Human capital investment is proxied by expenditure on education and health. The data

analytical techniques were histogram normality test, VEC residual serial correlation LM tests and VEC residual heteroskedasticity tests confirm the justification and validity of the estimated results obtained in this research. The findings of the study have shown public expenditure on health and education, primary and secondary school enrolment have positive statistically significant effect on economic growth both in long run and short run. In addition, physical capital has positive whilst inflation has negative effect on economic growth. However, tertiary school enrolment has insignificant effect on economic growth both in long run and short run. The study recommended that government should increase budgetary allocation to education and health sector to boost human capital skills needed to drive knowledge-based economy. Also, government should establish special agencies with the responsibility of improving the skills and capabilities of human capital across all educational levels of the federation so as to sustain growth in the long run.

Ojima and Anyanwu (2021) conducted a study to examine the human capital investment and economic growth in Nigeria from 1989-2019. Specifically this study aims to examine impact of life expectancy, public expenditure on education, public expenditure on health, primary school enrolment, Human Development Index, used as proxy for Human Capital Development on economic growth with Nigeria in focus and between the period 1989 – 2019. Data were obtained within the scope of the study and the variables were within the period of investigation. The study adopted the unit root, the dynamic ordinary least squares, as well as the Error Correction Model (ECM) to test the short and long run relationship of the variables selected for the study. The findings showed positive correlation except Human Development Index and Primary school enrolment that were found to have negative relationship with the Nigeria economic growth. Thus far, it is proper to conclude that life expectancy, primary school enrolment, human development index and public expenditure on education majorly determines economic growth in the long run in Nigeria. This therefore proves that human capital investment is a determinant in the economic growth of Nigeria. The study recommended that government at all tiers should increase annual budgetary allocation to these sectors. Also government should intensify efforts in economic and social orientation to mobilize and inculcate sanitary and health culture in the people.

Irfan, Muhammad, Mansha, Asad, Javed, (2021) conducted a study to investigate impact of human capital investment on economic growth in Muslim and Non-Muslim Asian countries. Specifically, the sought to examine the long run influence human capital investment physical capital investment on economic growth. This study consists of 12 selected Muslims and Non-Muslims countries from SAARC and ASEAN region by taking annual data from 2001 to 2015. The methods of data analysis were IPS unit root test, Pedroni cointegration test and Fully Modified Ordinary Least Square (FMOLS) econometrics methods have been applied to find the relationship between human capital investment, physical capital investment and economic growth. In this study, the data of all variables have been taken from World Bank Database (WDI). The results of panel FMOLS described that the education expenditure, health expenditure, gross fixed capital formation, labor force and inflation positively linked with economic growth. The study recommended that institutions of health and education should be less corrupt for the wellbeing of regions. There is need to improve all the dimensions of governance e.g. economic and institutional which can provide the basis for good governance. There is a responsibility of administration to offer inducements for professionals to improve the level of quality education and health.

Mekoro, (2020) analyzed the impact of human capital development on economic growth in Ethiopia over the period 1974/5 -2018/9. The econometric models of Johnsesan cointegration, VECM and causality tests were applied to analysis short-run and long-run impact of Human capital on Economic growth. The result of the error correction model shows that the model is adjusting at a relatively stable rate of 74.3% towards the long-run equilibrium. The result shows that human capital proxied of (primary and secondary school enrolments) and active labour force have a positive statistical significant long run and short-run effect on economic growth in Ethiopia. Results reveal that education expenditure and life expectancy at birth have a positive and statistically significant long-run effect on economic growth. However, the expenditure on health, secondary school enrolment and official development assistance are statically significant and have an unexpected negative impact on long-run economic growth. Furthermore, the short-run causality tests results reveal that public expenditure on education, primary school enrolment, secondary school enrolment and RGDP have unidirectional causal effects. The study recommended that policymakers and/or the government give prioritize to create institutional capacity that increase school enrolment and strengthening the infrastructure or investment of educational and health institutions that produce quality of manpower to increase productivity.

Mamoloko and Collins, (2019) evaluated the relationship between human capital investment and economic growth in two sub-Saharan African countries (Kenya and South Africa). Specifically, the study sought to; examine the relationship between government expenditure on education and economic growth in two sub-Saharan African countries. The paper applied a quantitative approach and secondary data were collected from the World Bank economic and education indicators from 1987 to 2016 (30 years). A cross sectional panel data arrangement gave a total of 60 observations and the fixed effect panel regression was applied using the Gretl econometrics package. The paper highlights the significance

results from time dummies, which shows that time is of essence in empirical analysis of this relationship and that investment in education would yield positive result on economic growth with timing considerations; this indicates that a waiting attitude is essential when investing in human capital. The study recommended that economic policy makers should, in addition to universal primary education, commit more resources to secondary and university education to increase the stock of human capital in Africa as secondary and university education produce middle and high-level human capital.

Imide and Dania, (2019) examined the impact of human capital investment on economic growth in Nigeria. The specific objectives of the study are to; identify the impact of government education expenditure on economic growth in Nigeria and verify the impact of government education expenditure on economic growth in Nigeria. The study spans from 1991 to 2017. The study was ex post facto research design. The data analytical technique was Autoregressive distributive Lag model. The unit root test showed that apart from the interaction of health & education expenditure which was stationary at level others were stationary at first difference. The result of the co-integration test showed that there is a long term relationship between the dependent and independents variables. The empirical result shows that expenditure on health has a negative and insignificant impact on the economic growth of Nigeria. Again, the empirical result shows that while expenditure on education and expenditure on the interaction (mix) of education & health have positive and significant impact on Nigeria economic growth. The empirical result shows that expenditure on education has positive impact on Nigeria economic growth but not as much when the expenditure is on the interaction/proper mix of health and education. The study recommended that investment in human capital (proper mix of health & education) is the best form of investment for any economy and also, high level of human capital development holds the key to the nation's socioeconomic development.

Amadi and Alolote, (2019) conducted a study to examine Human Capital Investment as a Catalyst for Sustainable Economic Development in Nigeria. Specifically, this study aims to analyze the effect of education public expenditure on the Nigerian economy; identify the effect of health public expenditure on the Nigerian economy and verify the effect of capital formation on the Nigerian economy. The data used for the study were sourced from the central bank statistical bulletin and national bureau of Statistics over a period of 1986 to 2017. The method of data analysis was Ordinary Least Squares (OLS) techniques. The findings of the study reveal that there is a positive relationship between government expenditure on education and real gross domestic product. There is also a positive relationship between government expenditure on health and real gross domestic product while there is a positive relationship between gross capital formation and real gross domestic product. The t-test showed that; government expenditure on education has a significant impact on real gross domestic product in Nigeria. Government expenditure on health has a significant impact on real gross domestic product in Nigeria. Gross capital formation also has a significant impact on real gross domestic product in Nigeria. The study recommends that Nigerian policymakers should pay more attention to the health sector and increase its yearly budgetary allocation to it.

## 2.6. Gaps in Literature

Ojima and Anyanwu (2021) who examined human capital investment and economic growth in Nigeria from 1989-2019 failed to introduce control variables in the model. The study conducted by Mamoloko and Collins, (2019) on relationship between human capital investment and economic growth in two sub-Saharan African countries had a very narrow scope by selecting two sub-Saharan African countries (Kenya and South Africa) and data of their studies were outdated therefore there is need for further research on the topic with up to date data. The study covered literature gaps by adding extra variables like child mortality rate, life expectancy at birth, primary school enrollment rate and control variables like inflation rate and exchange rate to the existing model.

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## 3. Methodology

This study made use of Ex Post-Facto research design. To empirically examine the impact of human capital investment on economic growth in Nigeria, the data collected was subjected to Augmented Dickey-Fuller Unit Root test statistic, Johansen Co-integration test, serial correlation Lagrange Multiplier test. The method of data analysis was Autoregressive distributive Lag model. The data of the study were sourced from on-line World Bank Data indicators. The covered a period of 1985 to 2021 as defined in our model specification. The study employed e-view version (9) statistical application software to analysis the data because it is user- friendly software.

### 3.1. Model Specification for the Study

$$RGDP = f(EGE, HGE, PSER, SSER, TSER, CMR, LIFE, EXCHR, INFLA) \dots\dots\dots 3.1)$$

Where RGDP is real Gross domestic product (RGDP), EGE is Educational government expenditure, HGE is Health government expenditure, PSER is Primary school enrolment rate, SSER is Secondary school enrolment rate and TSER is Tertiary school enrolment rate, CMR is child mortality rate, LIFE is life expectancy at birth to the existing model and control variables EXCHR is exchange rate and INFLA is inflation. In a linear function, it is represented as follows:

$$RGDP = \beta_0 + \beta_1 EGEt + \beta_2 HGEt + \beta_3 PSERt + \beta_4 SSERt + \beta_5 TSERt + \beta_6 CMRt + \beta_7 LIFEt + \beta_8 EXCHRt + \beta_9 INFLAt + \mu_t \dots\dots\dots (3.2)$$

Where:  $\beta_0$  = Constant term,  $\beta_1$  to  $\beta_6$  = Regression coefficient,  $\mu_t$  = Error Term and t is the period.

To reduce the outliers among the variables, all variables will be expressed in logarithmic form.

$$\text{LogRGDP} = \beta_0 + \beta_1 \text{LogEGEt} + \beta_2 \text{LogHGEt} + \beta_3 \text{LogPSERt} + \beta_4 \text{LogSSERt} + \beta_5 \text{LogTSERt} + \beta_6 \text{LogCMRt} + \beta_7 \text{LogLIFEt} + \beta_8 \text{LogEXCHRt} + \beta_9 \text{LogINFLAt} + \mu_t \dots\dots\dots (3.3)$$

Where:  $\beta_0$  = Constant term,  $\beta_1$  to  $\beta_6$  = Regression coefficient,  $U_t$  = Error Term and t is the period.

Descriptive Statistics of the Variables

**Table 1** Result of Descriptive Statistics

	RGDP	EGE	HE	PSER	SSRE	TSER	LIFE	CMR	EXCHR	INFLA
Mean	221123.7	378918.7	1299949.	56.44548	33.96677	8.312903	50.17323	19.51290	71.92072	17.47033
Median	265379.1	106857.4	71685.40	63.10000	34.00000	9.800000	49.03000	19.10000	92.33810	10.38478
Maximum	678950.9	1613579.	4430132.	70.00000	56.21000	11.10000	54.84000	25.70000	157.4987	75.40165
Minimum	37474.95	1554.200	658.2000	0.900000	23.00000	4.200000	46.98000	14.10000	0.000000	0.686099
Std. Dev.	187144.2	556741.7	1726438.	13.90766	9.560438	2.540963	3.203677	3.682458	62.02218	15.86911
Skewness	0.680205	1.327233	0.830602	-2.193925	0.484447	-0.444440	0.382456	0.182465	0.058667	1.954144
Kurtosis	2.379315	3.044198	1.898005	9.138402	2.081413	1.436721	1.424405	1.704124	1.246032	7.098694
Jarque-Bera	2.888118	9.103854	5.133069	73.53873	2.302472	4.177184	3.962304	2.341107	3.991470	41.42892
Probability	0.235968	0.010547	0.076801	0.000000	0.316246	0.123861	0.137910	0.310195	0.135914	0.000000
Sum	6854835.	11746479	40298405	1749.810	1052.970	257.7000	1555.370	604.9000	2229.542	541.5802
Sum Sq. Dev.	1.05E+12	9.30E+12	8.94E+13	5802.692	2742.059	193.6948	307.9065	406.8148	115402.5	7554.862
Observations	36	36	36	36	36	36	36	36	36	36

Source: e-view's Result

The table shows descriptive statistics of the variables. In the model established in the study, there is one dependent variable and six independent variables. The descriptive statistics shows nature and position of the variables in form of mean, median, sum, number of observation, maximum, standard deviation.

Correlation Matrix of the Variables

**Table 2** Result of Correlation Matrix

	RGDP	EGE	HGE	PSER	SSRE	TSER	LIFE	CMR	EXCHR	INFLA
RGDP	1.000000	-0.283960	-0.370896	-0.119637	-0.435550	0.469814	-0.521523	0.447743	-0.196424	0.199263
EGE	-0.283960	1.000000	0.915134	-0.156539	0.826294	0.561693	0.798919	-0.671971	-0.023240	-0.387524

HGE	-0.370896	0.915134	1.000000	-0.070224	0.875696	0.634892	0.889612	-0.763777	0.079109	-0.442932
PSER	-0.119637	-0.156539	-0.070224	1.000000	0.160989	0.419484	0.099590	-0.322033	0.457533	-0.298349
SSRE	-0.435550	0.826294	0.875696	0.160989	1.000000	0.817473	0.877907	-0.844737	0.386457	-0.506433
TSER	-0.469814	0.561693	0.634892	0.419484	0.817473	1.000000	0.809080	-0.932833	0.395414	-0.514505
LIFE	-0.521523	0.798919	0.889612	0.099590	0.877907	0.809080	1.000000	-0.930428	0.064053	-0.508878
CMR	0.447743	-0.671971	-0.763777	-0.322033	-0.844737	0.932833	-0.930428	1.000000	-0.191110	0.539213
EXCHR	-0.196424	-0.023240	0.079109	0.457533	0.386457	0.395414	0.064053	-0.191110	1.000000	-0.198851
INFLA	0.199263	-0.387524	-0.442932	-0.298349	-0.506433	0.514505	-0.508878	0.539213	-0.198851	1.000000

Source: e-view's Result

This correlation matrix presents a table showing correlation coefficients between sets of variables. Each random variable (Xi) in the table is correlated with each of the other values in the table (Xj). This result of correlation matrix helps to identify which pairs of variables have the highest correlation. This test is to detect whether exact or perfect relationship exist among explanatory variables (multicollinearity). This test presented clear understanding on the assumption of ordinary least square that there is no perfect or exact linear relationship among explanatory variables. The result of correlation matrix showed that every explanatory variable in the study is linearly independent of each other.

**Table 3** Results of Stationarity (unit root) test

Variables	Variables' Name	ADF- Statistic	5% Critical Value	Remark
RGDP	Real gross domestic product	-3.201355	2.963972	1 (0)
EGE	Education Government Expenditure	-4.713798	2.948404	1 (1)
HGE	Health Government Expenditure	-6.777885	2.948404	1 (1)
PSER	Primary School Enrolment Rate	-3.374626	2.948404	1 (1)
SSER	Secondary School Enrolment Rate	-7.304434	2.948404	1 (1)
TSER	Tertiary School Enrolment Rate	-6.313951	2.948404	1 (1)
LIFE	Life expectancy at Birth	-4.978281	2.948404	1 (1)
CMR	Child Mortality Rate	-3.290183	2.963972	1 (0)
EXCHR	Exchange Rate	-5.682503	2.948404	1 (1)
INFLA	Inflation Rate	-4.543399	2.963972	1 (0)

Source: Author's computation from E-view 9

In the table 4.1.1, the variables that were tested with unit root are shown, the values for Augmented Dickey Fuller (ADF) statistics are presented, the lag level of each variable was identified. The Mackinnon critical values at 5% level of significant were pointed out. The order of integration of each variable was enumerated, and finally the stationarity position of each variable was also stated. The research work based the level of augment whether the variable was stationary or not stationary on 5 percent significance level. When Augmented Dickey Fuller statistic is greater than Mackinnon 5 percent critical value in absolute term, it is concluded that the variable is stationary. Eight variables were stationary at first difference while two variables were stationary at level. It is now referable to use Autoregressive Distributive Lag Model (ADLM) to estimate the parameters.

### 3.2. Johansen Co-integration Test Results

Since all the variables are integrated of order, 1 (1). It is necessary to determine the existence of long run equilibrium relationship between the variables. Separate co-integration tests were carried out on real gross domestic product (RGDP), education government expenditure (EGE), health government expenditure (HGE), primary school enrolment rate (PSER), secondary school enrolment rate (SSER), tertiary school enrolment rate (TSER), child mortality rate (CMR), life expectancy at birth (LIFE), inflation rate (INFLA) and exchange rate (EXCHR). Non-stationary time-series can be co-



integrated if there are linear combinations of them that are stationary, that is, the linear combination does not have a stochastic trend. In other words, if two or more I(1) variables are co-integrated, they must obey an equilibrium relationship in the long-run, although they may diverge substantially from that equilibrium in the short run. The co-integration tests are based on the Johansen and Juselius (1989) test. Tables 4.3.1 present the co-integration test results.

Ho = There is no co-integration (no long run relationship among Variable)

**Table 4** Bound Co-integration Test Results

ARDL Bounds Test		
Date: 05/02/22 Time: 14:59		
Sample: 1990 2020		
Included observations: 30		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	7.593626	9
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	1.88	2.99
5%	2.14	3.3
2.5%	2.37	3.6
1%	2.65	3.97

Source: Author's Computation from E-view 9

The co-integration result in table 4.3 for the model (RGDP, EGE, HGE, PSER, SSER, TSER, LIFE, CMR, EXCHR and INFLA) reveals that there is a long-run relationship among the variables (RGDP, EGE, HGE, PSER, SSER, TSER, LIFE, CMR, EXCHR and INFLA) since f-statistic (7.593626) was greater than 5% lower and upper bound critical value (3.30). We therefore reject the null hypothesis of no co-integration amongst the variables and accept the alternative hypothesis.

### 3.3. Estimation of Regression Model

**Table 5** Empirical Results of the Auto-regressive Distributive lag Model ARDL

Dependent Variable: RGDP				
Method: ARDL				
Date: 05/02/22 Time: 14:57				
Sample (adjusted): 1990 2020				
Included observations: 31 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (0 lag, automatic): EGE HGE PSER SSRE TSER LIFE				
CMR EXCHR INFLA				
Fixed regressors: C				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.*</b>
RGDP(-1)	0.430294	0.196567	2.189050	0.0406

EGE	0.029627	0.155521	0.190503	0.8508
HGE	0.082516	0.061185	1.348623	0.1925
PSER	1710.949	2818.867	0.606963	0.5507
SSER	10153.85	12069.13	0.841307	0.4101
TSER	48314.70	42222.75	1.144281	0.2660
LIFE	-132917.1	41492.74	-3.203383	0.0045
CMR	-77973.07	42505.82	-1.834409	0.0815
EXCHR	-756.6542	882.2983	-0.857595	0.4013
INFLA	-939.1764	2074.611	-0.452700	0.6556
C	8441794.	2767923.	3.049866	0.0063
R-squared	0.886467	Mean dependent var		221123.7
Adjusted R-squared	0.779701	S.D. dependent var		187144.2
S.E. of regression	147393.1	Akaike info criterion		26.91102
Sum squared resid	4.34E+11	Schwarz criterion		27.41985
Log likelihood	-406.1208	Hannan-Quinn criter.		27.07688
F-statistic	2.836374	Durbin-Watson stat		2.026468
Prob(F-statistic)	0.022631			
*Note: p-values and any subsequent tests do not account for model selection.				

Source: Author's Computation from E-view 9

The result of the regression analysis represents the model for the interactive effects of trade openness, foreign direct investment and economic growth in Nigeria. The empirical result shows that the coefficient of education government expenditure (EGE) has positive and insignificant impact on real gross domestic product (RGDP) because [P-value (0.8508) was greater than its significant value (0.05)]. The empirical result shows that the coefficient of health government expenditure (HGE) has positive and insignificant impact on real gross domestic product (RGDP) because [P-value (0.1925) was greater than its significant value (0.05)]. The empirical result shows that the coefficient of primary school enrolment rate (PSER) has positive and insignificant impact on real gross domestic product (RGDP) because [P-value (0.5507) was greater than its significant value (0.05)]. The secondary school enrolment rate (SSER) has positive and insignificant impact on real gross domestic product (RGDP) because [P-value (0.4101) was greater than its significant value (0.05)]. The tertiary school enrolment rate (TSER) has positive and insignificant impact on real gross domestic product (RGDP) because [P-value (0.2660) was greater than its significant value (0.05)]. The life expectancy at birth (LIFE) has negative and significant impact on real gross domestic product (RGDP) because [P-value (0.0045) was greater than its significant value (0.05)]. The child mortality rate (CMR) has negative and insignificant impact on real gross domestic product (RGDP) because [P-value (0.4013) was greater than its significant value (0.05)]. The exchange rate (EXCHR) has negative and insignificant impact on real gross domestic product (RGDP) because [P-value (0.4013) was greater than its significant value (0.05)]. The inflation rate (INFLA) has negative and insignificant impact on real gross domestic product (RGDP) because [P-value (0.6556) was greater than its significant value (0.05)]. The result of the F – statistical test shows that the overall regression of the variables is statistically significance. This is because observed values of the F – statistics (2.8363) was greater than its critical value (0.022631). Again, our empirical result shows that the R-squared (R<sup>2</sup>) is 0.886467.

### 3.4. Econometric /Second Order Test

The null hypothesis; there is Autocorrelation.

The Breuch-Godfrey Serial correlation LM Test was used to identify whether the model suffers from autocorrelation problem. The autocorrelation problem violates ordinary least squares assumption that says there is no correlation among error terms of different observation. Breuch-Godfrey Serial correlation LM Test is a statistic that ensures that

the assumption of ordinary least squares was not violated. The result of Breuch-Godfrey Serial correlation LM Test shows that there is no serial correlation problem because its f-statistic (12.475385) was greater than its P-value (0.0000). So, we reject the null hypothesis and accept the alternative hypothesis.

**Table 6** Result of Breuch-Godfrey Serial Correlation LM Test

<b>Breusch-Godfrey Serial Correlation LM Test:</b>			
F-statistic	12.475385	Prob. F(1,19)	0.0000
Obs*R-squared	7.233752	Prob. Chi-Square(1)	0.0000
Test Equation:			
Dependent Variable: RESID			
Method: ARDL			
Date: 05/02/22 Time: 15:05			
Sample: 1990 2020			
Included observations: 31			
Presample missing value lagged residuals set to zero.			

Source: Author's Computation from E-view 9

### 3.5. Result of Ramsey Reset Test

The null hypothesis; there is Specification Error.

**Table 7** Result of Ramsey Reset Test

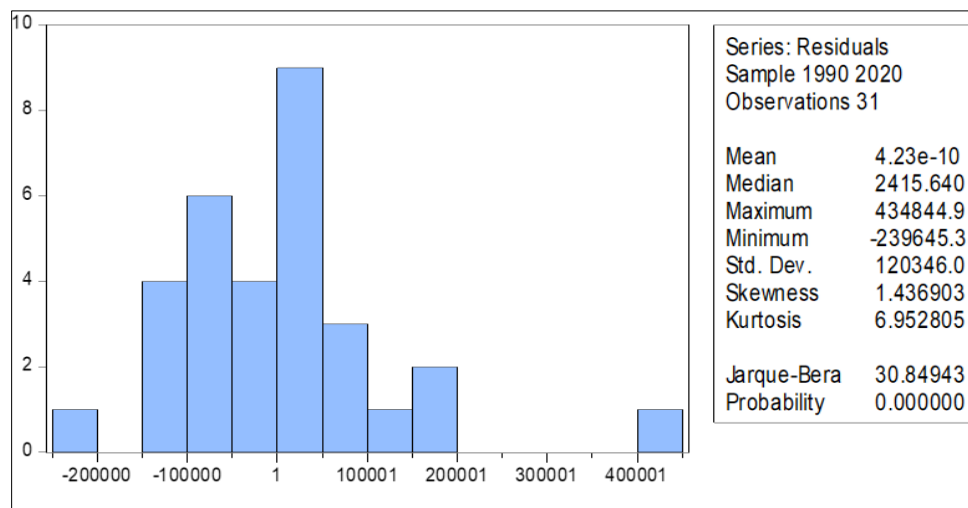
<b>Ramsey RESET Test</b>			
Equation: UNTITLED			
Specification: RGDP RGDP(-1) EGE HGE PSER SSRE TSER LIFE CMR EXCHR INFLA C			
Omitted Variables: Squares of fitted values			
	Value	df	Probability
t-statistic	6.316216	19	0.0003
F-statistic	8.099993	(1, 19)	0.0003
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	2.27E+09	1	2.27E+09
Restricted SSR	4.34E+11	20	2.17E+10
Unrestricted SSR	4.32E+11	19	2.27E+10

Source: Author's Computation from E-view 9

This second order test checks whether the model of the study suffers model specification error. The null hypothesis; there is model specification error. From the results of the Ramsey Reset test, the probability values (0.0003) for Ramsey Reset's t-statistics was less than 0.05. So, we reject the null hypothesis and accept the alternative hypothesis. This implies that model include core variables in the model. It does not include superfluous variables. The functional form of the model is very well specified, there is no error of measurement in the regressand and regressors.

### 3.5.1. Histogram Normality Test

Normality test is done to check if the residuals of the error term have a normal distribution. Normality test is conducted using Jacques-Bera (JB) test. In testing for normality, approach used by Paavola (2006) for testing normality using Jacques-Bera test was adopted.



Sources: E-view 9.0 Version

**Figure 1** Normality test for each of the Distribution

Jarque-Bera (JB) test is statistics that compute both skewness and Kurtosis. Skewness shows the degree symmetry (normal distribution). The normal measurement is zero/0. Kurtosis is a statistics that compute degree of peakedness. The normal measurement is three/3. A distribution is skewed if one of its tails is longer than the other. A skewed distribution can be positive or negative. Positive skewed distribution means that it has a long tail in the positive direction. Negative skewed distribution means that it has a long tail in the negative direction. The null hypothesis is that there is no skewness and Kurtosis in the model. We reject the null hypothesis because the probability value of Jarqua-Bera statistics (0.0000000) which is less than 0.05. This implies that the residuals do follow normal distribution.

### 3.6. Test of Hypotheses

The results for the various hypotheses testing are presented in the section.

#### 3.6.1. Test of Hypothesis one

H01: Education expenditure has no significant impact on the economic growth in Nigeria.

In testing this hypothesis, education government expenditure (EGE) was regressed against real GDP (RGDP). The empirical result showed that the coefficient of education government expenditure (EGE) had positive and insignificant impact on real GDP (RGDP) because [P-value (0.8508) was greater than its significant value (0.05)]. The empirical finding reveals that education government expenditure (EGE) had positive and insignificant impact on the economic growth in Nigeria.

#### 3.7. Test of Hypothesis two

H02: Health government expenditure has no significant impact on the economic growth in Nigeria.

In testing this hypothesis, health government expenditure (HGE) was regressed against real GDP (RGDP). The empirical result showed that the coefficient of health government expenditure (HGE) had positive and insignificant impact on real GDP (RGDP) because [P-value (0.1925) was greater than its significant value (0.05)]. The empirical finding revealed that health government expenditure (HGE) has positive and insignificant impact on economic growth in Nigeria.

#### 3.8. Test of Hypothesis Three

H03: Tertiary school enrolment rate has no negative insignificant impact on the economic growth in Nigeria.

In testing this hypothesis, tertiary school enrolment rate (TSER) has positive and insignificant impact on real GDP (RGDP) because [P-value (0.2660) was greater than its significant value (0.05)]. The empirical finding reveals that tertiary school enrolment rate (TSER) has positive and insignificant impact on the economic growth in Nigeria.

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#### 4. Summary of Findings

The following are the major findings of the study:

- Education expenditure (EGE) had 43% positive and insignificant impact on the economic growth in Nigeria [P-value (0.8508) was greater than its significant value (0.05)]. It implies that a percent change in education expenditure results to 43 percent positive impact on economic growth in Nigeria.
- Health expenditure (HGE) had 8% positive and insignificant impact on economic growth in Nigeria [P-value (0.1925) was greater than its significant value (0.05)]. It implies that a percent change in health expenditure results to 8 percent positive impact on economic growth in Nigeria.
- Tertiary school enrolment rate (TSER) had 48% positive and insignificant impact on the economic growth in Nigeria [P-value (0.2660) was greater than its significant value (0.05)]. It implies that a percent change in Tertiary school enrolment rate results to 48 percent positive impact on economic growth in Nigeria.

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#### 5. Conclusion

This study concludes that the human capital investment has positive and insignificant impact on the economic growth in Nigeria. Appropriate investment in education and health is fundamental to any meaningful economic development programme that must be pursued by any developing nation especially Nigeria. It takes into account all the opportunities, strategies and challenges that might face the process of human development. Nigeria can only reposition herself as a potent force through the quantity and quality of the products from the primary, secondary and tertiary schools' systems, and by making her manpower relevant in the highly competitive and globalize economy through a structured well-funded, appropriate, profitable investment in health and education in the right direction and strategies planning of her health and educational institutions. The conclusion of this study is line with the new endogenous growth theory that was developed by Romer (1986) and Lucas (1988) as a solution to the omissions and deficiencies in the Solow-Swan neoclassical growth model. The Solow-Swan model assumed that output is a function of capital and labour. The labour in the equation depicts human capital. The endogenous growth theory was to explain long run economic growth through some endogenous mechanisms that increase growth. The endogenous mechanism which the new endogenous growth theory meant was human capital. The "learning by doing" model is also used in the Arrow model to explain how self-practice and innovation result in productivity and improved human capital. It is because learning by doing leads to a decrease in labor required to create a unit of output. The Uzawa-Lucas model explains how economic growth, in the long term, is attributed to the accumulation of human capital. In order to produce human capital, education should be used.

#### *Recommendations of the Study*

Based on the findings of this study, the following recommendations were made.

- Government should start and sustain allocating 20 percent increase of funds to capital expenditure on education to provide facilities such as libraries, laboratory equipment, computers and modern learning equipment. Government should attract international donor agencies like World Bank, United Nations and UNESCO to help and put funds into the educational sector.
- The Federal Government should start and sustain implementation of the National Health Act so that health government expenditure will have positive significant impact on economic growth in Nigeria. Allocations made to the Basic Health Care Provision Fund (BHCPF) should be drawn directly from the National Health Act, which seeks no less than 1% of the Consolidated Revenue Fund of the Federation.
- Government should look into the proper adjustment of the education curriculum by incorporating skills training in every field of study in tertiary institutions. Government should revive exist industries in the Nigeria and build new manufacturing, service and construction industries where graduates of tertiary institution can work thereby encourage high rate of tertiary institutions enrolment.
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## Compliance with ethical standards

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### *Disclosure of conflict of interest*

No conflict of interest among the authors.

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