



THE TREND ANALYSIS AND LONG-RUN NATURE BETWEEN HUMAN CAPITAL DEVELOPMENT AND ECONOMIC GROWTH IN NIGERIA

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ABSTRACT

The analysis looked at changes in economic growth and trends in the development of the Nigerian human capital from 1990 to 2020, alongside the long-term connection between economic progress and the advancement of human capital in Nigeria. Secondary data was utilized for this analysis. Annual data on infant mortality rate, GDP per capita, and primary school enrolment for the period of 1990 to 2020 were obtained from WDI. Data collected were analyzed using tables, graphs, and Auto Regressive Distributed Lag Models. Also, human capital development was disaggregated into health and education components. While the health component of human capital was measured using infant mortality rate and the education component of human capital development was measured using primary school enrolment. Results from the trend analysis showed that economic growth of Nigeria which was proxied by GDP per capita fell from 1500 in 1990 to 1400 in 2001 but rose significantly from 2001 to 2015 before but suffering a downward trend from 2016 to 2020. However, Education which was measured using primary school enrolment rate rose from 85 percent in 1990 to 102 percent in 2006. But, a steady rate of decline followed from 2007 to 2020. More so, the health status of the nation improved considerably within the study period as Mortality rates fell consistently from 120 in 1990 to about 74 in 2020. After confirming the stationarity properties of the data, using ADF and Phillips Perron unit root test, the ARDL was used in the study to look at the long-term connection among the variables. Findings suggests that relationship exists among the variables of interest in the long run. We therefore draw the conclusion that the Nigerian economy has a long-term pattern of relationship with both economic growth and the enhancement of human resources.

Keywords: Human capital development; economic growth; population; education; health; sustainable development; Nigeria.

1. INTRODUCTION

One of the major tenets of growth in any economy is substantial increase in the level of quality and quantity

of products produced, and of which, human capital actively takes part [1]. As opined by Ejere [2], "the term human capital describes the human element in a production process or operation, and it comprises the

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whole expertise, skills and potentials of the labour force". Hence, human capital among all other factors of production plays a crucial role in every production process, and as such, its negligence can make any economy experiences loss. Human capital development involves making sustainable investments in the skills and abilities of human beings in order to aid productivity. These investments could be viewed via two lines- education and health sectors as a major contributor to productivity is when labour is skillful and healthy in the production process [3]. Hence, while concentrating on the skill acquisition (education) component of human capital development, equal attention must be paid to the health component of human capital, as studies such as Keji [4] had shown that neglecting the health life of human beings was also having a direct negative influence on the economy.

Nigeria as a country is greatly enriched with natural resources, however, the optimal maximization of these resources depends hugely on the human capital component of the human resources in Nigeria. Hence, for the country to attain the desired economic growth, emphasis and adequate attention must be paid to the human resources and the human capital development of the economy. Nigeria has invested significant resources and efforts in the fields of health and education, as have other economies, in the hopes that this will increase individuals' productivity and, as a result, the nation's economy. In addition to being economic resources, these resources are costly to society because they can also be used for other purposes. Policymakers and even the general public may consequently have a great deal of interest in researching the connections between economic growth and the dynamics of human capital, especially in light of patterns in enrollment in primary schools and mortality rates.

2. LITERATURE REVIEW

This section focuses on the survey of both the pertinent theoretical and empirical literature on the development of human capital and economic growth.

2.1 Augmented Solow Growth Model

The theoretical foundation for this study is the Solow growth model which was developed as a means of rejuvenating the neoclassical growth theory, which was unable to explain the large disparity in income between rich and poor nations. Solow's Model of economic development, according to Gruzina et al., [5], and Mankiw, Romer, and Weil [6], should be supplemented by human capital investment. The steady state path of output per capita in an economy,

according to the Solow Augmented Growth Model, follows a linear temporal trend. The pace of technical advancement determines the slope of this trend, while the intercept represents population increase and the proportions of production allocated to physical and human capital investment.

The model assumes that there is an initial discrepancy in income per person and steady state value, which causes variances in income per person and growth rates. The Augmented Solow Growth model predicts that impoverished nations' income levels will tend to catch up with those of wealthy nations if they have equal savings rates for both human and physical capital and increase their investment in the latter.

2.2 Empirical Review of Literature

An understanding of the relationship between economic progress and the development of human capital in Nigeria was also provided by Otu and Adenuga [7] with the use of co-integration techniques which incorporated the Error Correction Model on secondary data from 1970-2003. Result from the study posited that human capital investments accelerated economic growth. However, Economic growth was positively and significantly impacted by physical capital formation.

Sankay et al. [8] Utilizing "the VECM on an annual secondary data from 1970 to 2008, examined the influence of development of human capital on the economy of Nigeria. The observations indicated that human capital, as measured by recurrent and real capital expenditure on education, real GDP, real capital stock, labour force, and total enrollment in schools, had a significant impact on economic growth, as measured by real gross domestic product. . In an attempt to explore the role of human capital development on the economic growth of Nigeria", Edesiri and Samuel [9] established that "a significant relationship existed between human capital development and economic growth using Ordinary Least Square method on a time series data from 1970 to 2011".

Omotayo, [10] observed in an investigation that while recurrent education spending is adversely correlated with economic growth, capital education spending is favorably correlated with economic growth, according to the study which utilized the conventional least square methodology to establish the relationship between the expansion of human capital and the growth of the economy. Recurrent health spending, on the other hand, was shown to be favorably correlated with economic progress, but there is an adverse correlation between the growth of the economy and

capital health spending. Anyanwu et al. [11] investigated the link between Nigeria's economic growth and its human capital. The study, which used the auto-regressive distributed lag method on time series data from 1981 to 2010, proved the presence of co-integration between economic growth indicators and the factors of development of human capital in Nigeria. Additionally, results indicated that during the studied years, indices of human capital development had a favorable influence on the growth of the Nigerian economy. However, statistical analysis typically deemed their effects to be negligible. Additional data showed that any short-run distortion had its balance completely restored.

On the other hand, Idenyi et al., [12] observed “in an enquiry, a strong and long-term association between the Nigerian economic progress and government spending. According to the study which employed the VECM to determine the association between expenditure on human capital and the growth of the Nigerian economy. The study did note, however, that public spending on education and the growth of the economy are positively correlated, while spending on health care and economic growth are negatively correlated”.

Utilizing the OLS method on secondary data which spans from 1982 to 2016, Obikwelu [13] investigated “the impact of human capital development on Nigeria's industrial industry. Result from the findings showed that human capital development had positive relationship with manufacturing output”. Also, in the study by Ogunniyi, [14], “employing a 34-year timeframe and the ARDL method. It was found that the development of human capital and Nigeria's economic growth had a long-term, dynamic link”.

Fadila and Adeyinka [15] analyzed “the unpredictable impact of human capital development on ECOWAS nations' economic advancement from 1980 to 2016. Results from the empirical investigation suggests that a significant positive association exists between economic growth and expenditures in education, health and school enrollment for ECOWAS countries. In the same vein, Using time series data from 1980 to 2015, in an attempt to analyze the impact of human capital development on economic growth using the Ordinary Least Square approach”, Uzodigwe et al. [16] “the study was able to measure the amount and quality of human resources in the Nigerian economy by grouping the labor force of the country into educational categories ranging from basic, secondary, and tertiary levels of education. According to study findings, government spending on labor force development, health care, and education are positively correlated with economic growth. Furthermore,

enrollment into the various levels of educational institutions posed a negative association with the growth of the economy”.

Also, in an investigation of the link between human resources and economic expansion using the ECM, Adebayo and Taiwo [17] found “a long-term link between the growth of the economy and human capital”. However, it was also found out that while trade openness and physical capital impacted economic growth negatively, manufacturing and interest rate positively and significantly impacted economic growth. Also the study suggested that human capital did not significantly contribute to economic growth.

Aminu [18] utilized “the ARDL Models to determine the effect of schooling tax and investment in human capital on the growth of the Nigerian economy from 1995 to 2019. Findings from the empirical investigation suggests that education tax and investment in Human capital has a favorable and considerable impact on Nigeria's economic expansion”. To establish a connection between the increase of human capital and economic expansion in Nigeria, Imandojemu et al. [19] used the vector auto-regressive on data from 1990-2018. Empirical findings posited that human capital investment was significantly associated to the growth of the economy.

In an analysis on the extent to which economic growth is influenced by the advancement of human capital, Abubakar et al. [20] through “the use of Auto Regressive Distributed Lag approach on time series data from 1983 to 2018, demonstrated that in the short and long term, the human development capital component produced a positive influence on the progress of the economy. In addition, results revealed that the effect of education was larger than other components or measures of human capital development”.

Keji, [4] examines “the link between the growth of the economy and the development of human capital in Nigeria from 1981 to 2017 using VECM models. The study found a substantial long-term link between the expansion of Nigeria's economy and the improvement of its human resources”. Similarly, Toyosi, [21] observed “a long-term significant association between the development of human capital and economic progress, Using the Fuller Generalised least squares method on annual time series data from 1981-2017”.

Bachama et al. [22] explored “the influence of human capital development on the expansion of the Nigerian economy using time series data covering 1970 to 2019. The analysis which utilized the ARDL Model showed

that public spending on health and education has a strong and favourable relation with the growth of the economy in both the long and short term. However, labour force participation rate was found to be negatively and significantly related to the growth of the economy, while trade openness and inflation were found to be insignificant to economic growth”.

3. METHOD

This study's objective employed a descriptive analysis on annual secondary data. Time series data which was sourced from WDI [23] was utilized to analyze the data for this study, which aimed to determine how the increase of Nigeria's human capital affected the country's economic growth. This section's goal is to spell out the analytical strategy that will be used to assess the relative efficacy and reliability of the opinions offered in the literature and provide empirical support for the inquiry. Graphs, and tables were employed for the purpose of simplicity in the presentation of results.

Hypotheses

$$H_0 : b_{1j} = b_{2j} = b_{3j} = 0 \quad (\text{where } j= 1,2,3)$$

$$H_1 : b_{1j} \neq b_{2j} \neq b_{3j} \neq 0$$

$$\Delta \ln gdp_t = \alpha_{01} + b_{11} \ln gdp_{t-i} + b_{21} edu_{t-i} + b_{31} imr_{t-i} + \sum_{i=1}^p a_{1j} \Delta \ln gdp_{t-i} + \sum_{i=1}^{q1} a_{2j} \Delta edu_{t-i} + \sum_{i=1}^{q2} a_{3j} \Delta imr_{t-i} + \mu_t \quad (\text{eqn 4})$$

This research uses the following common error correction model;

$$\Delta LNGDP_t = \beta_0 + \beta_1 \Delta EDU_t + \beta_2 \Delta IMR_t + ECM_{t-1} + \mu_t \quad (\text{eqn 5})$$

4. FINDING AND DISCUSSION

This part focuses on result presentation starting with the unit root result, ARDL bounds test and trend analysis. This is in a bid to analyze trends in the expansion of Nigeria's economy and human capital.

4.1 Trend of Economic Growth and Development of Human Capital

An overview of the examination of Nigeria's economic growth and human capital development trends is given in this subsection. GDPper capita was used as a proxy for economic growth in order to examine the pattern of economic growth in Nigeria over the course of the study. GDP per capita measures the economic output on a nation per person: Throughout a timeframe from 1990 to 2020, all amount of money earned in Nigeria per person. Fig. 1 present the trend analysis of GDP per capita. The indicator plotted in Fig. 1 shows that the GDP per capita of Nigeria fell from 1500 in 1990 to 1400 in 2001. The GDP per capita of Nigeria during this period was higher than that of the sub-Saharan Africa which ranged from 1300 to 1200 although lower than some African countries for instance GDP percapita was averagely 5500 for south Africa. However, compared to developed countries, the GDP per capita of Nigeria was very low. This is because of the population growth, and the prevalence of subsistence agriculture as the mainstay of the economy.

In this study, the dependent variable is GDP per capita, which serves as a proxy for economic growth. Infant mortality rate and primary school enrollment are the explanatory or independent variables.

The functional connection appears as follows when we use the Keynesian definition of aggregate output;

$$Y = Y_{ad} = C + I + G + NX \quad (\text{eqn 1})$$

$$GDP = f(EDU, IMR,) \quad (\text{eqn 2})$$

Eqn 3 presents the equation for multiple linear regression as follows:

$$LNGDP = \beta_0 + \beta_1 EDU + \beta_2 IMR + \mu \quad (\text{eqn 3})$$

The conditional ARDL model is then specified as follows to conduct the bounds test for cointegration;

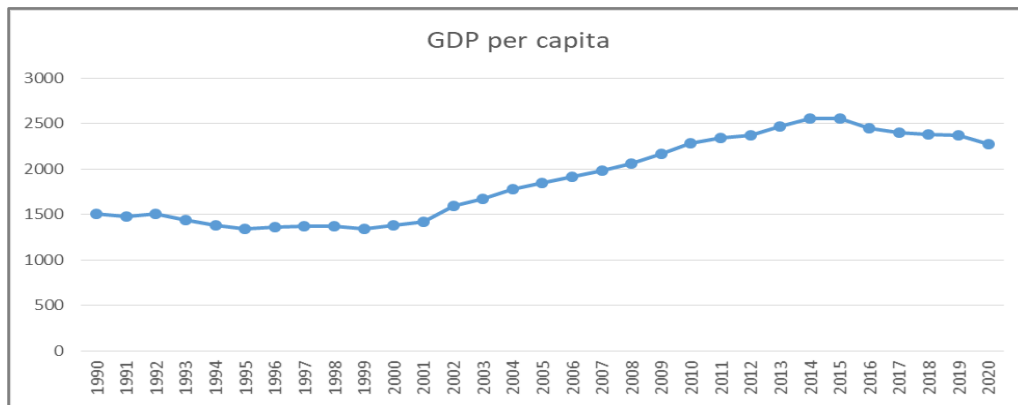


Fig. 1. Trends of economic growth
Source; Author's computation

The GDP per capita of Nigeria began to witness a consistent rise from 2001 to 2015. This coincided with the era of the millennium development goal which was effected in year 2000. Also, it also was as a result of a shift of power from the military led government to the democratic system of government. The surge in the economic growth of Nigeria from 2001 to 2015 greatly stemmed from economic and political measures such as privatization of the moribund state owned assets, trade liberalization, aids and the revamping of the service sector [24]. Furthermore, the economic growth of the country began to witness a decline from 2016 to 2020 as it fell from 2500 in 2016 to 2300 in 2020. This is as a result to economic policies put in place to checkmate excessive importation.

Summarily, comparing the global average of the trend of the global regions with that of Nigeria revealed that the average GDP per capita of Nigeria lagged behind. Efforts should be invested in providing quality jobs for Nigerians, investment in small and medium scale industries should also be encouraged.

Having ascertained the trend of Nigeria's economic growth, the study will investigate the trend of Nigeria's human capital development. Two components of human capital development which are, education and health were observed. Education was proxied using primary school enrollment while health was measured by infant mortality rate.

The trends in Fig. 2 illustrates that the health status of the nation improved considerably within the study period. Mortality rates fell consistently from 120 in 1990 to about 74 in 2020. This suggests that while economic growth improved, health status improved equally. This is as a result of the various reforms in various sectors of the economy which also includes the health sector. Some of these health reforms includes, National Economic and Empowerment Development Strategy (NEEDS), Democratic Governance and comprehensive Health Reforms, (1999- 2007), National Action Committee on Aids, and so on which also led to the increase in health care expenditures. Hence as the economic growth witnessed a rise, it was also accompanied with a rise in the health status of the economy see Fig. 3.

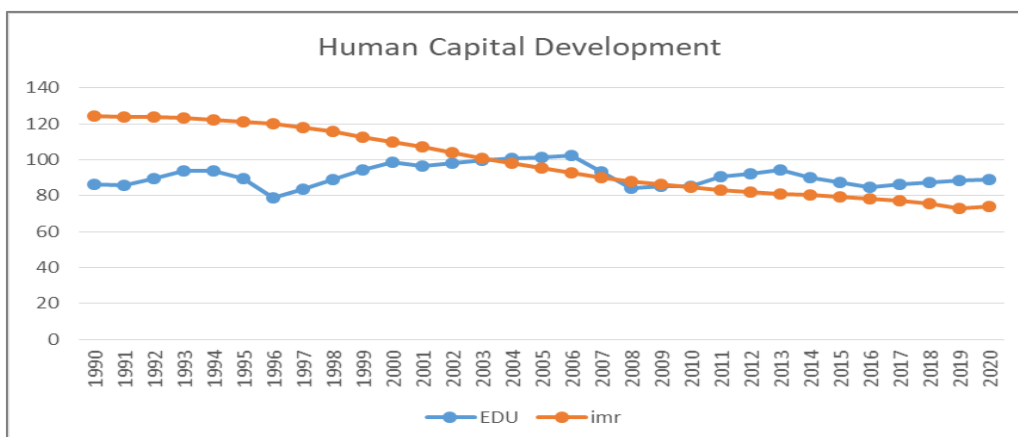


Fig. 2. Trends of education and health
Source; Author's computation

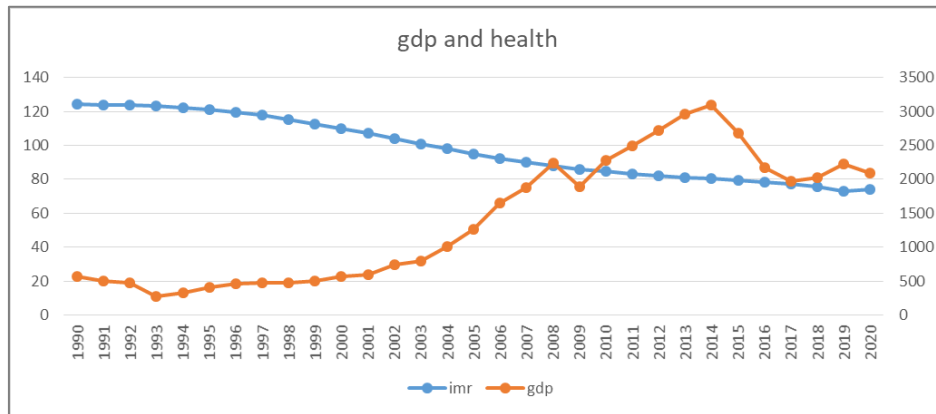


Fig. 3. Trends of economic growth and health
Source; Author's computation

Education which was measured using primary school enrollment rate rose from 85 percent in 1990 to 102 percent in 2006. However, a steady rate of decline followed from 2007 to 2020. In 2020, the current rate of primary school enrollment stands at 89 percent. The initial rise in enrollment rate is attributed to some educational reforms which include, Universal Basic Education and the adoption of the Millennium Developmental goals. However, the current situation of Nigeria could be attributed to high rate of poverty which has made it impossible for children to afford basic education. Also, even when the schooling is free, child labour, is seen as a means of an extra income to the household thereby leading to an increased rate of school dropouts. According to the ministry of Education, 30% of the Nigerian population are illiterate.

In summary, the gross domestic product of the nation is declining in the past five years, the education levels is also on a decline although the health components has recorded success, it shows that the education system needs attention. It is as a result of this that the government and other stakeholders have to put measures in place to improve on the economic growth and the human capital development of the nation. This can be done by the improvement of learning conditions and adequate funding for education to be relatively affordable for all. Also, policy makers urgently needs to formulate policies to combat illiteracy and dropping out of schools.

4.2 Descriptive Statistics

Before exploring the econometric relationship between economic progress and the development of human capital, the study explored the characteristics of the variables through descriptive statistics. Such statistics include the median, mean, minimum and maximum values, kurtosis, jarque-Berra statistic,

standard deviation as well as skewness. Table 1 presents the the outcome of descriptive statistics.

As shown in Table 1, the time-series data set's series all demonstrated a decent degree of consistency, with the median and mean values being within the range of the series' maximum and minimum values. Also, the standard deviation, which gauges how much each series deviates from its mean shows that the series is quite dispersed from its mean with GDP being the most dispersed with a value of 929.6981 and EDU being the least with a value of 5.91.

The skewness of the distribution, which predicts the level of asymmetry, is used to establish the normality assumption shows that all the variables normally distributed. It is assumed that the skewness coefficient will be zero for a completely symmetrical distribution.

Furthermore, the kurtosis values shows the degree of peakedness of the series distribution. The estimated value for the kurtosis coefficient for a normally distributed series is 3.0. The distribution is said to be leptokurtic (high peaked distribution) when the kurtosis value is higher than 3.0 and platykurtic (flat topped distribution) when the distribution is lesser than 3.0. Kurtosis with the coefficient of 3.0 is said to be mesokurtic (not very flat or peaked). Therefore, from Table 1, GDP, education and infant mortality rate are platykurtic.

Moreso, the Jarque-Berra statistic which shows the normality of the distribution of a data series revealed that EDU, GDP, and IMR does not reject the normality assumption.

4.3 Unit Root Test

The study proceeds to the estimation of the time series properties. We performed three separate unit root tests, which are frequently used in the literature, in an effort to ascertain the order of the series, that is, in testing

for stationarity of the data employed. In order to confirm the order of integration we first conducted the Augmented-Dickey Fuller (ADF) and the Phillips-Perron (unit root tests). Next, we conducted the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root test only when there is a discrepancy between the results of the ADF and the PP unit root tests, Specifically, outcomes from the results of ADF and PP of GDP per capita (Ingdp), Education (EDU), gross fixed capital formation (GFCF), and inflation with only constants showed stationarity at first difference, while foreign direct investment (FDI) with only constant showed stationarity at level. KPSS was used to determine the order of integration for primary school enrolment rate (EDU), and infant mortality rate (IMR).

However, with constant and trend, outcomes from the results of ADF and PP of gross domestic product per capita (LNGDP), Education (EDU), gross fixed capital formation (GFCF), and inflation showed

stationarity at first difference, while KPSS was employed to ascertain the order of integration for foreign direct investment (FDI), and infant mortality rate (IMR).

Summarily, the results revealed that although the order of integration ranges from 0 to 1, There was no integration to order 2 for any of the variables, and this provides the justification for the adoption of the auto regressive distributed lag (ARDL).

4.4 Cointegration Test

This study employs the ARDL bound testing procedures suggested by Pesaran et al., [25] to determine whether a long-term association between variables exists. Table 2's outcome shows that at the 1%, 5%, and 10% levels of significance, the F statistics is greater than the lower and upper bound critical values.

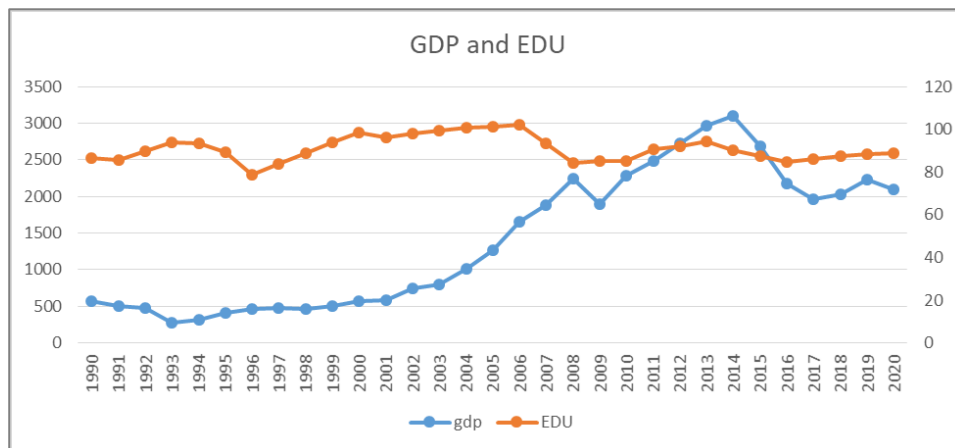


Fig. 4. Trends of economic growth and education
Source; Author's computation, 2022

Table 1. Descriptive statistics of variables

Descriptive statistics	GDP	EDU	IMR
Mean	1414.229	90.92573	98.27742
Median	1268.383	89.70445	95.20000
Maximum	3098.986	102.1081	124.3000
Minimum	270.2240	78.66348	73.20000
Std. Dev.	929.6981	5.914984	18.15134
Skewness	0.257457	0.262411	0.175664
Kurtosis	1.550779	2.313111	1.488801
Jarque-Bera	3.055282	0.965204	3.109240
Probability	0.217047	0.617176	0.211270
Sum	43841.09	2818.697	3046.600
Sum Sq. Dev.	25930156	1049.611	9884.134
Observations	31	31	30

Source; Author's computation, 2022

Table 2. Unit Root Tests

Unit root with constant

	ADF			PP			KPSS		
	level	1 st Diff	order	level	1 st Diff	Order	Level	1 st Diff	Order
LNGDP	-0.5795 (0.8608)	-4.2291 (0.0026)	I(1)	-0.6440 (0.8459)	-4.2078 (0.0027)	I(1)	-	-	
EDU	-3.1850(0.0313)	-	I(0)	-2.0261 (0.2747)	-3.7030(0.0094)	I(1)	-	-	
IMR	-2.7566(0.0775)	-4.4208 (0.0019)	I(1)	-0.5163 (0.8745)	-1.3083(0.6120)	-	0.7105**		I(1)

Source; Author's computation, 2022

Unit root with constant and trend

	ADF			PP			KPSS		
	Level	1 st Diff	Order	Level	1 st Diff	Order	Level	1 st Diff	Order
LNGDP	-1.5011 (0.8067)	-4.1419 (0.0147)	I(1)	-1.8032 (0.6780)	-4.0809 (0.0168)	I(1)	-	-	
EDU	-3.2216(0.1000)	-3.7888 (0.0319)	I(1)	-1.9924 (0.5817)	-3.8186 (0.0299)	I(1)	-	-	
IMR	-4.9874 (0.0021)	-	I(0)	-1.4175 (0.8348)	-0.9587 (0.9346)	-	0.1250	0.1613**	I(1)

Notes:

a: ()Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant*

b: Lag Length based on SIC

c: Probability based on Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

d: Probability of PP and ADF based on MacKinnon (1996) one-sided p-values

Source; Author's computation, 2022

Table 3. ARDL bounds test (H_0 : No presence of long-run relationship)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	14.75650	10%	2.75	3.79
k	5	5%	3.12	4.25
		2.5%	3.49	4.67
		1%	3.93	5.23

From Table 2, the results of the cointegration test shows a long run relationship between economic growth and independent variables (infant mortality rate and primary school enrolment). This is because at 5% level of significance, the F-statistics (14.75650) is higher than the lower [I(0)] and upper [I(1)] bounds (3.12) and (4.25) respectively. Hence, there is no sufficient evidence to accept the null hypothesis of no long-run relationship assumption.

5. SUMMARY

The major goal of this research was to explore the link between economic expansion and development of human capital in Nigeria from 1990 to 2020. But precisely, the study looked into the patterns of economic expansion and human capital development in Nigeria between 1990 and 2020. This was done in an effort to descriptively show the behavior and nature of the development of human capital and economic growth in Nigeria across the sample period. The study also looked at the long-term link between economic growth and the development of human capital. This was important to demonstrate empirically whether and how the development of human capital affects economic growth in Nigeria.

Secondary and time series data which includes, gross domestic product per capita, infant mortality, and primary school enrollment, spanning from 1990 – 2020 were sourced from WDI 2020 edition, as published by the World Bank. Annual data on infant mortality rate, GDP per capita. More so, the study employed a range of approaches which includes graphs and charts for the trend analysis, the ARDL model for analyzing the long-run connection between economic growth and the development of human capital. The empirical findings from this study is hence summarized as follows;

- i) In the trend analysis, the study found that economic growth gdp per capita of Nigeria fell from 1500 in 1990 to 1400 in 2001 but rose significantly from 2001 to 2015 before but suffering a downward trend from 2016 to 2020.
- ii) Education which was measured using primary school enrolment rate rose from 85 percent in 1990 to 102 percent in 2006. However, a

steady rate of decline followed from 2007 to 2020.

- iii) Health status of the nation improved considerably within the study period. Mortality rates fell consistently from 120 in 1990 to about 74 in 2020. This suggests that while economic growth improved, health status improved equally.
- iv) A long run link exists between economic growth and human capital development of the Nigerian economy.

6. CONCLUSION

In the pursuit of increased economic growth rate in Nigeria, human capital development should be given proper and adequate attention so that labour productivity will increase which will consequently lead to improved economic performance, and ultimately translate to improved growth levels. However, this study demonstrated that a long-run relationship exists between human capital development and economic growth. Also, from the trend analysis, it is evident that there is room for improvement in the economic growth and the human capital development levels of Nigeria. Conclusively, the study recommended that tremendous progress will be recorded in the economic performance strive when a proper and adequate attention is given to the human capital development of the nation. This can be achieved by combating pandemic diseases which threatens the health quality of the nation, and by making basic education mandatory for the citizens.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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