



AN ANALYTICAL STUDY OF THE EFFECT OF HUMAN CAPITAL DEVELOPMENT ON ECONOMIC GROWTH IN NIGERIA

ABSTRACT

This study analytically examines the effect of human capital development on economic growth in Nigeria from 1981 to 2016 using annual time series data. Economic growth proxied by Real gross domestic product (RGDP) and primary school enrolment was sourced from World Bank Development Indicators, (2017) while life expectancy (LEX) and adult literacy rate proxy for literacy rate was sourced from Central Bank of Nigeria Annual Report and Statement of Account of various publications. Vector Autoregressive (VAR impulse response and variance forecast error decomposition test were employed to analyse the data. The VAR impulse response test results revealed that, life expectancy (LEX) has positive effect on economic growth (RGDP) while literacy rate (ALR) and primary school enrolment (PSE) has negative effect on economic growth (RGDP) in Nigeria. It is recommended that, relevant policies and programmes such as unconditional cash transfers (UCTs) which are standard welfare programmes for schools should be made in order to increase effectiveness of both literacy rate and primary school enrolment so that they will have positive effect on economic growth. Also, concerted effort in terms of establishing well-equipped medical laboratories, on job training of the existing medical staff so as to increase the level of human capital in terms of life expectancy in Nigeria.

Keywords: *Human Capital Development, Economic Growth, Impulse Response, Variance Decomposition and Nigeria*

1.0 Introduction

Human capital refers to the human factor in the production process; and consists of the combined knowledge, skills or competencies and abilities of the workforce of all factors of production, only human being is capable of learning, adapting or changing, innovative and creative (Ejere, 2011). Human capital development, following Harbison (1973), can be seen as the deliberate and continuous process of acquiring requisite knowledge, skills and experiences that are applied to produce economic value for driving sustainable national development.

Furthermore, it has been stressed that the differences in the level of socio-economic development across nations is attributed not so much to natural resources and endowments and the stock of physical capital but to the quality and quantity of human resources (Dauda, 2010). Oladeji and Adebayo (1996) opined that human resources are a critical variable in the growth process and worthy of development. They are not only means but, more importantly, the ends that must be served to achieve economic progress. In addition, the wealth and prosperity of nations rest ultimately upon the development of people and the effective commitment of their energies and talents. Capital and natural resources are passive agents. The active agents of modernization are human beings, for they alone can accumulate capital, exploit natural resources and build political and social organizations (Sankay, Ismail & Shaari, 2010).

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It was opined by Adedeji and Bamidele (2003) that the generally agreed causal factors responsible for the impressive performance of the economy of most of the developed and the newly industrializing countries is an impressive commitment to human capital formation. This has been largely achieved through education and training of individuals in these countries. It is important to know that human capital, which gained reasonable attention, started with seminar papers two decades of the last century. It has refined to highlight its endogenous contributions to the growth process (Romer, 1996). Therefore, all developing countries were advised to invest in human capital formation of which Nigeria also participated (Adedeji & Bamidele 2003). Nigerian government did not only start training people in schools, but formulated educational policies in relation to primary, secondary and tertiary institutions towards making education workable in Nigeria. Nigeria has come a long way in her development planning efforts. A major component of the development planning process is the effect in human capacity building through education and training.

Nigeria's Human Development Index (HDI) value for 2015 is 0.527 which put the country in the low human development category positioning it at 152 out of 188 countries and territories. Between 2005 and 2015, Nigeria's HDI value increased from 0.466 to 0.527, an increase of 13.1 percent. Between 1990 and 2015, Nigeria's life expectancy at birth increased by 7.0 years, mean years of schooling increased by 0.8 years and expected years of schooling increased by 3.3 years. Nigeria's GNI per capita increased by about 98.4 percent between 1990 and 2015. Nigeria's 2015 HDI of 0.527 is above the average of 0.497 for countries in the low human development group and above the average of 0.523 for countries in Sub-Saharan Africa. From Sub-Saharan Africa, countries which are close to Nigeria in 2015 HDI rank and to some extent in population size are Congo (Democratic Republic of Congo) and Ethiopia, which have HDIs ranked 176 and 174 respectively. However, when 0.527 the value of Nigeria's HDI is discounted for inequality, the HDI falls to 0.328, and a loss of 37.8 percent due to inequality in the distribution of the HDI dimension indices. Congo (Democratic Republic of the) and Ethiopia show losses due to inequality of 31.9 percent and 26.3 percent respectively. The average loss due to inequality for low HDI countries is 32.3 percent and for Sub-Saharan Africa it is 32.2 percent. The Human inequality coefficient for Nigeria is equal to 37.5 percent (UNDP, 2015).

Now that the country is aspiring to be among the 20 leading economies in the world by the year 2020, developing Nigeria's human capital is critical. Human capital development is a prerequisite for Nigeria and Nigerians to become competitive in the 21st century globalize economy which is skill and knowledge based. A country's competitiveness in the New International Economic Order (NIEO) is strongly connected to the quality of her human capital. Hence human capital development is undoubtedly the pivot for any meaningful programme of economic development of Nigeria and indeed of any country (Ejere, 2011).

Human capital is increasingly believed to play an important role in the growth process. However, adequately measuring its stock remains a major challenge. In Nigeria, measuring human capital remains a major challenge. In this study, human capital development was proxy by life expectancy, literacy rate (proxy by adult literacy rate), and primary school enrolment while economic growth was proxy by real gross domestic product. The major crucial question that guided this research is: What is the effect of human capital development on economic growth in Nigeria from 1981 to 2016? Therefore, the objective of this study is to examine the effect of human capital development on economic growth in Nigeria from 1981 to 2016.

Following this introduction, the remaining part of this study is organized thus; Literature Review, Data and Methodology, Results and Discussions, Conclusion and Recommendations of the study.

2.0 Literature Review

2.1 Concept of Economic Growth

The concept of economic growth is one which has attracted the interest and focus of researchers worldwide. Economic growth is the most fundamental indicator of an economy's health. They defined it as the rate of growth of

the national income of a country, measured by the annual percentage rate of change of country's gross domestic product (Bolton & Khaw, 2006).

2.1.1 Determinants of Economic Growth

Determinants of economic growth are interrelated factors that directly influence the rate of economic growth i.e. increase in real GDP of an economy. These include the following: Natural resources, Human resources, Capital goods, Technology and efficient use of resources (Jhingan, 2003). These are explained briefly below.

- a. **Natural Resources:** Natural resources include anything that exist in nature and which has exploitable economic value. Rate of economic growth increases on increase in quantity and quality of natural resources, examples of natural resources which can have major effects on the rate of economic growth include fossil fuels, valuable metals, oceans and wildlife (Jhingan, 2003).
- b. **Human Resources:** Human resources include both skilled and unskilled workforce. Increase in the quantity and quality of the workforce increases the rate of economic growth. Here, increase in quality refers to improvement of skills the workers possess. When more people work, more goods and services are produced and when more people work, more goods and services are produced and when more skilled workers do a job, they produce high value goods and services (Jhingan, 2003).
- c. **Capital Goods:** Capital goods are tangible assets such as plant and machinery that can carry out processes which result in the production of other goods and services. Capital goods require big investment initially but they increase production and growth rate in future periods (Jhingan, 2003).
- d. **Technology:** Technology includes methods and procedures used to produce various goods and services. New technology may be improved gradually by investing in research. Better techniques once devised, allow faster production and increase rate of economic growth (Jhingan, 2003).
- e. **Efficiency factor:** Achieving high output to input ratio, is the result of efficiency. Efficiency includes both productive and allocative efficiency. High efficiency increases growth rate when it is coupled with full employment. To achieve maximum growth rate, an economy must use its available resources in the least costly way to produce the optimum mix of goods and services and it must use its resources to the maximum extent possible (Jhingan, 2003).

2.1.2 Human Capital Development and Economic Growth

According to Akingbade (2006) skills development, and by extension skills formation systems, are important because of their contributions to national productivity. Enhanced skills enable national economies raise production and create wealth. When people acquire skills, they make themselves more productive, able to produce more output and income for a given amount of time and effort. He found human capital to be a significant determinant of the amount of physical capital investment in an economy. He suggests that a more educated labour force can raise the returns to investment in physical capital, i.e. that skills and capital are complementary. The variation in investment rates in physical capital across countries is partly a function of absorptive capacity, which in turn depends on availability of human capital and other institutional factors.

The rate of return on investment in physical capital would appear to be a positive function of the supply of human capital; where the latter is scarce, the former is low, and so too is the incentive to invest. If so, raising levels of educational attainment should, *ceteris paribus*, increase returns to physical capital and thereby boost investment rates. Investment in physical capital, particularly capital equipment, is an important determinant of growth. Capital-skill complementarities largely reflect the skills required to master technologies in newly acquired capital equipment, specifically, more educated people are needed to operate higher-cost capital equipment incorporating sophisticated technology. He argued that globalization raises capital flows from developed to developing countries. This means that, even without technology imports, capital output ratios in developing countries rises and, given the complementarities between capital and skill, this would raise the relative demand for skilled labour. The acceleration of technical change

in recent decades has been complemented by greater numbers of workers with higher skills. Without a workforce that is continuously acquiring new skills, it would be difficult to reap most of the returns from technological progress he said.

More so, advancement of knowledge and innovation, and the diffusion of new methods of production are aided by higher levels of education and training. As with capital-skill complementarity, complementarities also exist between technology and skills. According to him the stock of human capital appears to be positively correlated with technological dynamism. The introduction of new technologies in lower income countries implies a reallocation of labour from low to high productivity activities, the latter being generally both more capital and skill intensive. This means that increased technology imports are likely to be accompanied by a rising ratio of capital to labour, and by demand for skilled labour (Akingbade, 2006).

2.2 Empirical Literature

Ilegbinosa (2013) examines the role of human capital investment on economic growth in Nigerian. In order to carry out this study, they employed the use of primary data through the use of questionnaires which were given to 120 respondents of various higher institutions in Edo State, Nigeria. The Chi-Square was used to analyse the data collected from the respondents and from the results, it is observed that investment in human capital has an impact on the development of the Nigerian economy; poor funding by the federal government of Nigeria is a major problem hindering adequate human capital investment in Nigeria. The major weakness of the study is in term of its generalization. The study used a total of 120 questionnaire administered to correspondents at University of Benin (UNIBEN), Ambrose Ali University, Ekpoma and Auchi Polytechnic and use the outcome to generalize or to interpret the role of human capital development on economic growth of Nigeria. That is to say, the sample size of this study is too small in making the generalization.

Atoyebi, Olaleye, Ishola, Adekunjo and Kadiri (2013) in their study examine the relative role of human capital development on economic growth in Nigeria from 1970 to 2010. Annual Time series data were used in the study. Johansen cointegration technique was employed to analyse the data. The findings from the Johansen cointegration test result shows that there is a strong evidence of long-run equilibrium relationship between human capital development and economic growth in Nigeria. The findings of the study might not be useful in policy formation because like other studies reviewed above, this study also used Johansen-Juselius technique to cointegration to analyse the data even when the variables are not integrated of the same order without conducting some restrictions during the analyses and one of the major assumptions before using Johansen-Juselius cointegration technique is that the variables must be integrated of the same order. Furthermore, the study proxy human capital development with total government education and health expenditure, external reserve, exchange rate while this study has proxied human capital development with life expectancy rate, literacy rate (proxy by adult literacy rate) and primary school enrolment.

Adejumo, Olomola, and Adejumo (2013) examined the effect human capital development has had on industrial growth in the light of various factors that could have shaped industrial performance in Nigeria from 1980 to 2010, using annual time series data. Ordinary Least Square (OLS) and Johansen Cointegration test was used to analyse the data. The Ordinary Least Square result shows that a percentage increase in primary and secondary enrolment will lead to 0.61% and 0.22% respectively increase in industry value added and are statistically significant at 5% level of significance while a percentage increase in labour force will lead to 0.85% decrease in industry value added at 5% level of significance. On the other hand, Johansen cointegration test result revealed the existence of a long-run equilibrium relationship between human capital development and industrial output in Nigeria. The study used Ordinary Least Square (OLS) Estimation to examine the effect of human capital development on industrial output even when the variables are not stationary at level (i.e all the variables in the study are integrated of order one: $I(1)$) making the OLS result to be spurious because one of the major assumption of OLS is that the variables under

observation must all be stationary at level. Therefore, the study could have use Johansen cointegration test as its technique of analysis.

Egbiremolen and Anaduaka (2014) employs the augmented Solow human-capital-growth model to investigate the impact of human capital development on national output, a proxy for economic growth in Nigeria, using quarterly time-series data from 1999 to 2012. Ordinary Least Square Estimation and Johansen Cointegration Test was used to analyse the data in the study. The OLS result revealed that for any one percentage increase in gross total capital formation, labour force and total government education expenditure will lead to 0.20%, 0.34% and 0.11% respectively increase in real gross domestic product and are all statistically significant at 5% level of significance. This implies that human capital development is indispensable in the achievement of sustainable economic growth in Nigeria, as there is an increase in economic performance for every increase in human capital development. The Johansen test results reveal that there is a long-run equilibrium relationship between human capital development and economic growth in Nigeria. The study used Ordinary Least Square Estimation and Johansen Cointegration to analyse the data even when some of the variables are I(1) and others are I(2) violating the basic assumptions of OLS and Johansen cointegration because one of the assumption of OLS is that the variables must be stationary at level while Johansen cointegration test can be carried out if the variables are integrated of the same order.

Furthermore, Omotayo (2015) investigates the impact of human capital development on economic growth of Nigeria, using annual time series data from 1980 to 2012. The paper employs Ordinary Least Square estimation to analyze the data. The result shows that human capital development has a positive but statistically insignificant impact on economic growth in Nigeria at 5% level of significance. The study could have also included granger causality test in its technique of analysis since one of its specific objectives is to investigate the causal relationship between human capital development and economic growth in Nigeria. The study proxy human capital development with oil export, real fixed gross capital formation, capital education and health expenditure, recurrent education and health expenditure while this study proxied human capital development with life expectancy rate, literacy rate (proxy by adult literacy rate) and primary school enrolment since any government education and health expenditure be it capital or recurrent is aimed at improving literacy rate and life expectancy respectively of its citizens.

Anyanwu, Adam, Obi and Yelwa (2015) examines the impact of human capital development on economic growth in Nigeria from 1981 to 2010, using annual time series data. Adopting the endogenous modeling approach cast within the autoregressive distributed lag (ARDL) framework, the bounds testing analysis indicated existence of co integration between economic growth and human capital development indicators at 1% level of significance. Findings also show that human capital development indicators had positive impact on economic growth in Nigeria within the reviewed periods; however, their impacts were largely statistically insignificant at 5% level of significance. Further evidence indicated that equilibrium is fully restored for any distortion in the short-run. The study stopped at 2010 while this study is carried out to cover up to 2016. More so, the study proxy human capital development with total government education and health expenditure, labour force, gross capital formation, primary, secondary and tertiary school enrolment and economic growth was proxy with gross domestic product. Human capital development in this study was proxied with life expectancy rate, literacy rate (proxy by adult literacy rate) and primary school enrolment while economic growth will be proxy with real gross domestic product.

Adeyemi and Ogunsola (2016) examines the impact of human capital development on economic growth in Nigeria, using annual time series data spanning from 1980 to 2013. The study employed ARDL Co-integration analysis to estimate the relationship among the variables used in the study. The findings from the study revealed that there is positive long-run relationship among secondary school enrolment, public expenditure on education, life expectancy rate, gross capital formation and economic growth but the relationship is not statistically significant at 5% level of significance. The results also showed that there is negative long-run relationship among primary, tertiary school enrolment, public expenditure on health and economic growth. The study stopped at 2013 while this study is

will be up to 2016. The study also proxies human capital development with total government education and health expenditure, life expectancy, gross capital formation, primary, secondary and tertiary school enrolment but this study proxied human capital development with life expectancy rate, literacy rate (proxy by adult literacy rate) and primary school enrolment.

3.0 Data and Methodology

This part of the study discusses the type and sources of data that are used in this research, model specification and techniques of data analysis.

3.1 Source/ Method of Data Collection

Annual time series data was used in this study. Real gross domestic product, Primary School Enrolment was sourced from World Bank Development Indicator (2017) from 1981 to 2016 while life expectancy rate and literacy rate (proxy by adult literacy rate) were sourced from Annual Report and Statement of Account of Central Bank of Nigeria (1985, 1990, 1995, 2000, 2005, 2010, 2015 & 2016) from 1981 to 2016. Economic growth proxy by real gross domestic product was transformed into logarithms in order to reduce the possibility of heteroskedasticity and also to make the interpretation of results in percentage.

3.2 Model specification

This study adopts endogenous growth theory as developed by Lucas (1988) basically represents an extension of the Solow (1956) neoclassical growth model incorporating positive externalities related to the accumulation of human capital through knowledge. Following Schultz (1993), it can be argued that the production of human capital is possible through education (by increasing the literacy rate) and health (by increasing the life span of the people) sector. The model assumes the form:

$$Y_i = A \cdot F(\mu h L_i, K_i) \cdot H_a^\gamma \quad (3.1)$$

Where, A is the total factor productivity, Y_i is the output of the i^{th} firm, L_i is the number of workers used by firm i , μ is the proportion of time that each worker devotes to production, h is the human capital of worker employed by the firm i , K_i is the physical capital used by firm i . H_a is the average human capital in the economy and γ is a positive coefficient. Here, effective labor input $\mu h L_i$ replaces the simple labor input L , specified in the standard Solow (1956) growth model. H_a^γ term is the externality effect of human capital, which raises economy-wide labour productivity. Mankiw, Romer and Weil (1992) explain the relationship as follow in a Cobb-Douglas production function with constant returns to scale:

$$Y = K_t^\alpha H K_t^\beta (A_t L_t)^{1-\alpha-\beta} \quad (3.2)$$

Where Y represents output, A is the level of technology. K , H and L are physical capital, human capital and labour respectively.

The study adopts Sims, (1998) VAR model in order to estimate the effect of human capital development on economic growth in Nigeria. The impulse response and variance decomposition test model is presented thus:

$$LRGDP_t = \alpha_1 + \sum_{i=1}^k \varphi_{1i} LRGDP_{t-1} + \sum_{i=1}^k \theta_{1i} LEX_{t-1} + \sum_{i=1}^k \delta_{1i} ALR_{t-1} + \sum_{i=1}^k \omega_{1i} PSE_{t-1} + \mu_{1t} \quad (3.3)$$

$$LEX_t = \alpha_2 + \sum_{i=1}^k \varphi_{2i} LRGDP_{t-1} + \sum_{i=1}^k \theta_{2i} LEX_{t-1} + \sum_{i=1}^k \delta_{2i} ALR_{t-1} + \sum_{i=1}^k \omega_{2i} PSE_{t-1} + \mu_{2t} \quad (3.4)$$

$$ALR_t = \alpha_3 + \sum_{i=1}^k \varphi_{3i} LRGDP_{t-1} + \sum_{i=1}^k \theta_{3i} LEX_{t-1} + \sum_{i=1}^k \delta_{3i} ALR_{t-1} + \sum_{i=1}^k \omega_{3i} PSE_{t-1} + \mu_{3t} \quad (3.5)$$

$$PSE_t = \alpha_4 + \sum_{i=1}^k \varphi_{4i} LRGDP_{t-1} + \sum_{i=1}^k \theta_{4i} LEX_{t-1} + \sum_{i=1}^k \delta_{4i} ALR_{t-1} + \sum_{i=1}^k \omega_{4i} PSE_{t-1} + \mu_{4t} \quad (3.6)$$

Where:

$LRGDP_t$ = Log of Real Gross Domestic Product

LEX_t = Life Expectancy.

ALR_t = Literacy Rate proxied by Adult Literacy Rate (ALR).

PSE_t = Primary School Enrolment.

$i = 1, 2, 3$ and 4

k = Total number of lags.

α = Autonomous term.

π_{ji} = Coefficients of the log of Real Gross Domestic Product.

θ_{ji} = Coefficient of Life Expectancy

δ_{ji} = Coefficient of Literacy Rate

ϑ_{ji} = Coefficient of Primary School Enrolment

μ_{ji} = Stochastic Error Term

3.3 Expected outcomes

The a priori expectation of this study is that, when there is productive increase in human capital development in terms of life expectancy (LEX), literacy rate proxied by adult literacy rate (ALR) and primary school enrolment, it will increase the rate of economic growth proxied by real gross domestic product; and when there is decrease in human capital development in terms of life expectancy (LEX), literacy rate proxied by adult literacy rate (ALR) and primary school enrolment, it will also lead to decrease in the level of economic growth. Therefore, it is expected that all the coefficients of the explanatory variables under observation will have a positive effect or relationship with the controlled variable.

3.4 Measurement of the variables

Real Gross Domestic Product (GDP): GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources (World Bank, 2015).

Life Expectancy: Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life (World Bank, 2015).

Literacy Rate (proxy by Adult Literacy Rate): Percentage of the population age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations (World Bank, 2015).

Primary Schools Enrolments: Total number of students enrolled in public and private primary education institutions regardless of age (World Bank, 2015).

3.5 Method of data analysis

Descriptive analysis was conducted in order to understand the pattern of human capital development and economic growth in this study. In a research study with large data, this analysis may help in managing the data and presenting it in a summary table which shows the mean value of the data, median, maximum, minimum, standard deviation, Jarque-Bera statistics etc. of data in the study. Correlation matrix test was also conducted among the variables in order to know the degree of responsiveness or association that each variable of the study has with one another. It will show for instance whether the variables have a strong positive relationship among or between one another or otherwise.

Furthermore, Stationarity test has however been conducted to ascertain the stationarity conditions of the variables using Augmented Dickey Fuller. More so, Vector Autoregressive (VAR) Test was conducted to find out the effect of human capital development on economic growth during the period under study via impulse response and variance decomposition test. Since VAR consider several endogenous variables together. But each endogenous variable is explained by its lagged, or past values and the lagged values of all other endogenous variables in the model; usually, there are no exogenous variables in the model because the model consider all variables as endogenous.

4.0 Results and Discussions

This chapter focuses mainly on various tests such as descriptive statistics analysis, unit root test, impulse response and variance decomposition and finally, VAR granger causality test. These tests were carried out respectively in order to achieve the objectives of the study.

4.1 Descriptive Statistics

Descriptive statistics analysis was conducted to show the behaviour of human capital development proxied by life expectancy (LEX), literacy rate proxied by adult literacy rate (ALR), primary school enrolment (PSE) and economic growth proxied by the real gross domestic product descriptively. The result is presented thus:

Table 4.1: Descriptive Statistics of RGDP, LEX, ALR and PSE.

	RGDP	LEX	ALR	PSE
Mean	3.27E+13	53.02778	58.95556	94.08563
Median	2.24E+13	53.00000	57.00000	93.45864
Maximum	6.98E+13	54.00000	66.90000	112.8100
Minimum	1.52E+13	51.00000	54.00000	78.45744
Std. Dev.	1.81E+13	0.906362	5.414660	8.573546
Skewness	0.901870	-0.289966	0.624019	0.479671
Kurtosis	2.268370	1.840726	1.650502	2.723704
Jarque-Bera	5.683138	2.520354	5.068119	1.495014
Probability	0.058334	0.283604	0.079336	0.473546
Sum	1.18E+15	1909.000	2122.400	3387.083
Sum Sq. Dev.	1.15E+28	28.75222	1026.149	2572.699
Observations	36	36	36	36

Source: Author’s computation using E-views 8.1, 2018

Based on the results of the descriptive statistical analysis in Table 4.1, economic growth proxied by real gross domestic product (RGDP) has an average value of 3.27E+13 over the period. It has a maximum value of 6.98E+13 and the minimum value is 1.52E+13. It has a standard deviation of 1.81E+13, which is low, suggesting that observations are clustered around the mean, thereby the distribution is not normal. The probability of its Jarque-Bera statistics is 0.06 suggesting that observation does not follow the normal distribution graph. The observation is positively skewed, as suggested by the result of skewness statistic of 0.90. The Kurtosis statistic suggest that the observation is a leptokurtic distribution, which has no fatter or wider peak than a normal distribution since the kurtosis statistic is not greater than 3. The result also revealed that, Life Expectancy (LEX) based on Table 4.1 has an average of 53.0 while the maximum value is 54.0 and the minimum value is 51.0. The variable has a standard deviation of 0.91, which is low and it suggest that observations are not normally distributed, but clustered around the mean. The skewness of the observation is -0.29. Meaning that, the observation is negatively skewed. The statistic of kurtosis 1.84 suggest that the observation is a leptokurtic distribution. The probability of its Jarque-Bera statistics of 0.28 suggest that the observation is not normally distributed.

Literacy Rate (ALR) based on the descriptive statistics in Table 4.1 has an average value of 59.0, the maximum value of 66.9 and a minimum value of 54.0. Literacy rate (ALR) has a standard deviation of 5.41, suggesting that the observations are not clustered around the mean. Rather, they are randomly distributed. The probability of its Jarque-Bera statistics of 0.08 suggest that, the observation does not follow the normal distribution graph. The observation is positively skewed, as suggested by the result of skewness statistic of 0.62. The Kurtosis statistic of 1.65 suggest that the observation is a leptokurtic distribution, which has no fatter or wider peak than a normal distribution since the kurtosis statistic is less than 3. Furthermore, based on descriptive statistic result in Table 4.1, primary school enrolment (PSE) has an average of 94.1, maximum value of 112.8 and the minimum value of 78.5.

Its standard deviation is 8.57, suggesting that the observations are not clustered around the mean. Rather, they are randomly distributed. The probability of its Jarque-Bera statistics of 0.47 means that, the observation does not follow the normal distribution graph. The observation is positively skewed, as suggested by the result of skewness statistic of 0.48. The Kurtosis statistic of 2.72 suggest that the observation is a leptokurtic distribution, which has no fatter or wider peak than a normal distribution.

4.2 Correlation Test

Correlation test has also been conducted on the variables in order to ascertain the degree of association among the variables. The result is presented thus:

Table 4.2: Correlation test result among RGDP, LEX, ALR and PSE (1981-2016)

	RGDP	LEX	ALR	PSE
RGDP	1.000000			
LEX	0.148236	1.000000		
ALR	0.948520	0.263987	1.000000	
PSE	-0.046744	0.168893	-0.149301	1.000000

Source: Author’s computation using E-views 8.1, 2018

Based on the correlation result in Table 4.2, there is a weak positive correlation between economic growth proxied by real gross domestic product (RGDP) and life expectancy (LEX) with the correlation coefficient of 0.14. Meaning that, increasing life span of the labour force will have a positive influence on economic growth in Nigeria. A strong positive correlation also exists between economic growth proxied by real gross domestic product (RGDP) and literacy rate proxied by adult literacy rate (ALR) with the correlation coefficient of 0.95. This implies that, literacy rate has great positive influence on economic growth in Nigeria. Since economic growth is driven by technological progress, acquisition of basic skills and knowledge is therefore a fundamental pre-requisite for any meaningful development.

The result also revealed a weak negative correlation between economic growth proxied by real gross domestic product (RGDP) and primary school enrolment (PSE) with the correlation coefficient of -0.05. This implies that, primary school enrolment has no positive influence on economic growth and this may be associated with government negligence of most primary schools. Literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) also has a weak positive correlation with life expectancy with the correlation coefficient of 0.26 and 0.17 respectively. Finally, there exist a weak negative correlation between literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) in Nigeria with the correlation coefficient of -0.15.

4.3 Unit Root Test

A stationary test known as the unit root test has been conducted in order to find out if the variables contain unit root or not. Since most economic variables, particularly macroeconomic variables are believed to follow an upward trend, it is therefore necessary to subject the variables to a stationarity test. In this study, stationarity tests have been carried out using Augmented Dickey-Fuller unit root test on the log of real gross domestic product (LRGDP), life expectancy (LEX), literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE). The results are presented in Table 4.3

Table 4.3: Augmented Dickey-Fuller Unit Root Test of LRGDP, LEX, ALR and PSE (1981-2016)

VAR	Augmented Dickey-Fuller test			5% Critical Value			Order of integration
	At Level	At First Difference	At Second Difference	At Level	At First Difference	At Second Difference	
LRGDP	-2.285004	-4.651538	-8.119148	-3.544284	-3.548490	-3.552973	I(1)
LEX	-2.989582	-8.730656	-8.071172	-3.544284	-3.548490	-3.557759	I(1)
ALR	-3.283582	-7.044651	-5.748179	-3.544284	-3.552973	-3.568379	I(1)
PSE	-3.390746	-4.351941	-6.938976	-3.548490	-3.548490	-3.552973	I(1)

Source: Author’s computation using E-views 8.1, 2018

Based on the unit root test results presented in Table 4.3 using 5% level of significance, economic growth proxied by log of real gross domestic product (LRGDP), life expectancy (LEX), literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) are not stationary at levels when both intercept and trend were included in the test. But they became stationary at first difference at 5% level of significance. Hence, they are all integrated of order one [I(1)].

4.4 Vector Autoregressive (VAR) Test

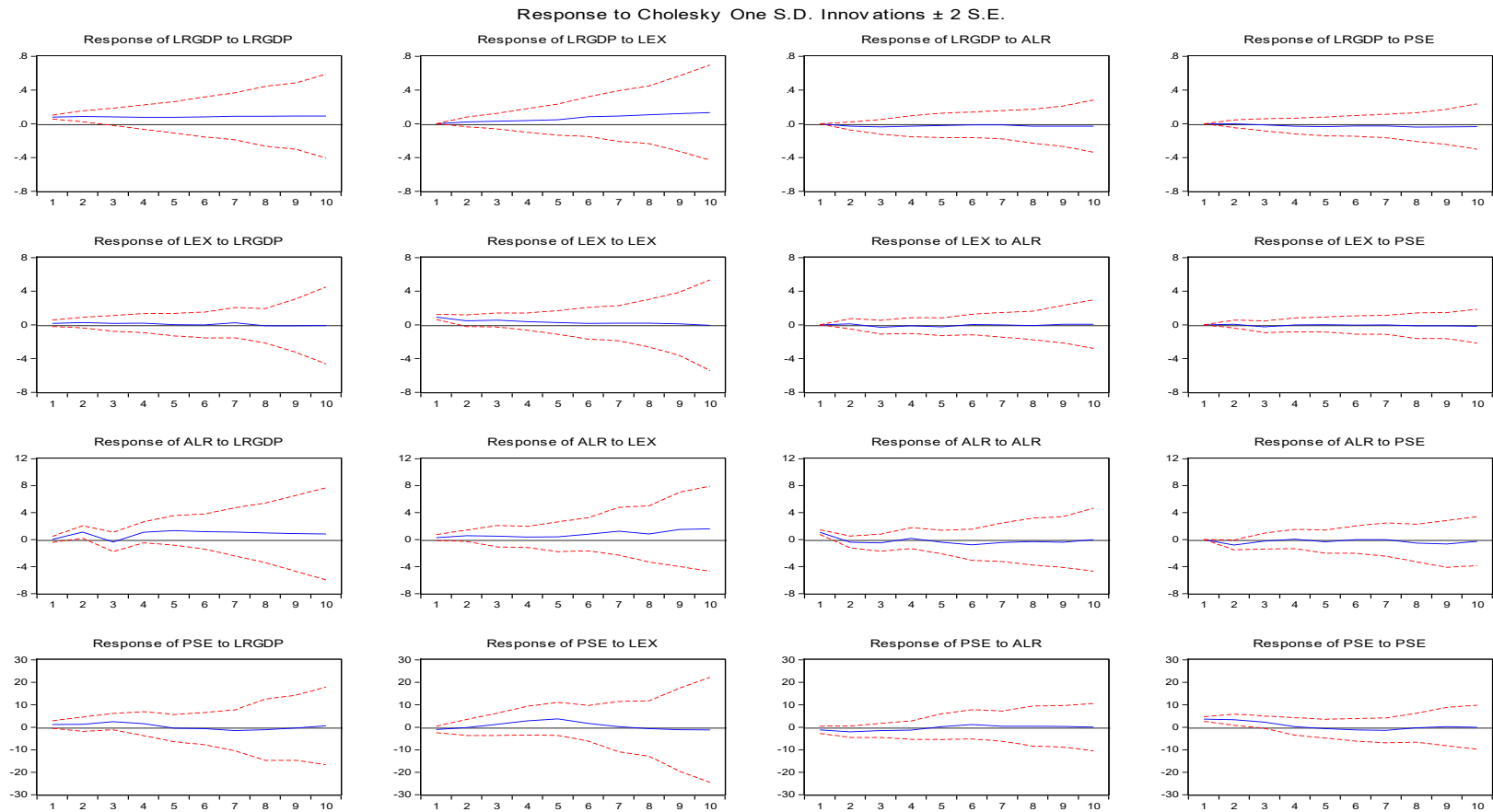
The vector autoregressive (VAR) is an econometric model used to capture the linear interdependencies among multiple time series. VAR models generalize the univariate autoregressive model (AR) model by allowing for more than one evolving variable. All variables in a VAR are treated symmetrically in a structural sense (although the estimated quantitative response coefficients will not in general be the same); each variable has an equation explaining its evolution based on its own lags and the lags of the other model variables. VAR modelling does not require as much knowledge about the forces influencing a variable as do structural models with simultaneous equations: The only prior knowledge required is a list of variables which can be hypothesized to affect each other inter-temporally (Asteriou & Hall, 2011).

The vector autoregressive (VAR) model was used only as a platform to enable the researcher carry out Impulse Response Functions (IRFs) and Variance Decomposition (VD) so as to investigate the dynamic effect between and among economic growth proxied by the log of real gross domestic product (LRGDP), life expectancy (LEX), literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) in Nigeria from 1981 to 2016.

4.4.1 Analysis of Impulse Response of the Variables

The impulse response, or impulse response function (IRF), of a dynamic system is its output when presented with a brief input signal, called an impulse. More generally, an impulse response refers to the reaction of any dynamic system in response to some external change. In both cases, the impulse response describes the reaction of the system as a function of time (or possibly as a function of some other independent variable that parameterizes the dynamic behavior of the system) (Hatemi, 2014). This test was conducted in order to determine the effect of life expectancy (LEX) and literacy rate proxied by adult literacy rate (ALR) on economic growth in Nigeria from 1981 to 2016

Figure 4.1: Impulse Response of LRGDP, LEX, ALR and PSE from 1981 to 2016



Source: Author's computation using E-views 8.1, 2018

Table 4.4: Impulse Response of Economic Growth Proxied by Log of Real Gross Domestic Product (LRGDP)

Response of LRGDP:				
Period	LRGDP	LEX	ALR	PSE
1	0.077624 (0.01261)	0.000000 (0.00000)	0.000000 (0.00000)	0.000000 (0.00000)
2	0.087177 (0.03316)	0.021062 (0.02705)	-0.028683 (0.02497)	-0.001520 (0.02297)
3	0.080082 (0.05627)	0.030142 (0.04443)	-0.037583 (0.03794)	-0.014372 (0.03301)
4	0.076768 (0.08399)	0.036505 (0.06620)	-0.030672 (0.04673)	-0.028266 (0.04426)
5	0.074582 (0.11883)	0.046691 (0.09313)	-0.020594 (0.06088)	-0.033636 (0.05654)
6	0.080419 (0.15733)	0.082919 (0.10803)	-0.014002 (0.08241)	-0.027505 (0.07212)
7	0.087689 (0.21153)	0.090598 (0.13830)	-0.013173 (0.10686)	-0.027361 (0.09692)
8	0.088011 (0.28669)	0.105507 (0.17684)	-0.030463 (0.13271)	-0.040423 (0.12410)
9	0.090097 (0.38898)	0.119913 (0.23719)	-0.030389 (0.16221)	-0.038097 (0.15388)
10	0.090301 (0.52631)	0.130897 (0.29940)	-0.030147 (0.19817)	-0.035004 (0.19358)

Cholesky Ordering: LRGDP LEX ALR PSE

Standard Errors: Monte Carlo (100 repetitions)

Source: Author’s computation using E-views 8

The result of the impulse response functions in Table 4.4 and Figure 4.1 shows that an unexpected one standard deviation “own” shocks in economic growth proxied by the log real gross domestic product (LRGDP) leads to a positive change or effect on economic growth (LRGDP) from the first quarter to the tenth quarter. The response of economic growth proxied by the log of real gross domestic product (LRGDP) to an unexpected one standard deviation shock in life expectancy (LEX) leads to a positive change or effect on economic growth (LRGDP) from the second quarter to the tenth quarter. Meaning that, life expectancy (LEX) is significant in influencing economic growth proxied by the log of

real gross domestic product because increase in life expectancy (LEX), increases the productivity of the available resources. For instance, by improving health of workers, and it may increase the incentives to undertake long-term investment like (most notably) human capital which in turn will increase the level of economic growth of a country (say Nigeria). The positive response of economic growth (LRGDP) to life expectancy (LEX) shocks has been recognized by Bloom, Canning and Sevilla (2001) where good health has a positive, sizeable and statistically significant impact on the aggregate output.

The response of economic growth proxied by the log of real gross domestic product (LRGDP) to an unexpected one standard deviation shock in literacy rate proxied by adult literacy rate (ALR) did not change or affected economic growth (LRGDP) in the first quarter but from the second quarter up to the tenth quarter, an unexpected one standard deviation shock in literacy rate proxied by adult literacy rate (ALR) lead to a negative change or effect on economic growth (LRGDP). Meaning that, literacy rate proxied by adult literacy rate (ALR) has no positive effect on economic growth during the period of the study. This might be associated with inadequate educational infrastructure in public schools which in turn has a negative effect on economic growth because the labour force may not be imparted with necessary skills or knowledge that can help improve the rate of economic growth in a country.

Response of economic growth proxied by the log of real gross domestic product (LRGDP) to an unexpected one standard deviation shock in primary school enrolment (PSE) did not change or affected economic growth (LRGDP) in the first quarter but from the second quarter up to the tenth quarter, an unexpected one standard deviation shock in primary school enrolment (PSE) lead to a negative change or effected economic growth (LRGDP). This implies that, primary school enrolment has no any positive significant in influencing economic growth in Nigeria.

Table 4.5: Impulse Response of Life Expectancy (LEX)

Response of LEX:				
Period	LRGDP	LEX	ALR	PSE
1	0.186045 (0.19822)	0.935946 (0.11632)	0.000000 (0.00000)	0.000000 (0.00000)
2	0.273827 (0.34799)	0.490879 (0.35609)	0.132151 (0.31013)	0.086995 (0.27623)
3	0.174169 (0.44272)	0.568912 (0.39497)	-0.282583 (0.36540)	-0.224082 (0.35038)
4	0.211012 (0.58661)	0.381047 (0.58305)	-0.098426 (0.45196)	-0.000316 (0.42840)
5	0.027427 (0.73258)	0.281447 (0.65727)	-0.226416 (0.50973)	0.034698 (0.48927)
6	-0.004010 (0.97824)	0.187013 (0.87963)	0.045671 (0.56591)	-0.015780 (0.52295)
7	0.255149 (1.28150)	0.193134 (1.01390)	-0.001278 (0.71473)	-0.006750 (0.64232)
8	-0.109268 (1.66119)	0.192745 (1.37028)	-0.071665 (0.87013)	-0.100494 (0.74714)
9	-0.090800 (2.10387)	0.127139 (1.64700)	0.077959 (1.03182)	-0.092011 (0.95374)
10	-0.077423 (2.73162)	-0.047442 (2.31945)	0.088319 (1.22468)	-0.157152 (1.15161)

Cholesky Ordering: LRGDP LEX ALR PSE

Standard Errors: Monte Carlo (100 repetitions)

Source: Author's computation using E-views 8.1, 2018

The results of the impulse response function in Table 4.5 and Figure 4.1 shows that, the response of life expectancy (LEX) to an unexpected one standard deviation shock in economic growth proxied by the log of real gross domestic product (LRGDP) leads to a positive change or effect on life expectancy (LEX) in the first quarter up to the fifth quarter initially but from the sixth period up to the tenth quarter an unexpected one standard deviation shock in economic growth (LRGDP) lead to a negative change or effect on life expectancy (LEX). Meaning that, economic growth (LRGDP) is significant in influencing life expectancy from the first quarter to the fifth quarter. Because increase in economic growth (LRGDP) rises the standard of living of individuals through increase in per capita income. Increase in per capita

income will make the individuals to have access to quality healthcare facilities, good diet thereby increasing their life span. But from the sixth quarter up to the tenth quarter, an unexpected one standard deviation shock in economic growth (LRGDP) has a negative influence on life expectancy. This occurs when the annual growth rate of an economy is less than population growth rate. Meaning that, the increase in economic growth has not increased the standard of living of the people because of low per capita income.

The response of life expectancy (LEX) to an unexpected one standard deviation of its “own” shock leads to a positive change or effect on life expectancy (LEX) from the first quarter up to the ninth period until the tenth quarter when it became negative. The response of life expectancy (LEX) to an unexpected one standard deviation shock in literacy rate proxied by adult literacy rate (ALR) leads to a positive change or effect on life expectancy (LEX) in the second quarter but from the third quarter up to the fifth quarter, unexpected one standard deviation shock in literacy rate (ALR) leads to a negative change or effect on life expectancy (LEX). During the sixth quarter it turned positive and immediately turned negative again in the seventh quarter up to the eighth quarter and suddenly turned positive from the ninth quarter up to the tenth quarter.

Response of life expectancy (LEX) to an unexpected one standard deviation shock in primary school enrolment (PSE) leads to a positive change or effect on life expectancy (LEX) in the second quarter and then negative from the third to fourth quarter. It became positive in the fifth quarter but in the sixth quarter up to the tenth period, unexpected one standard deviation shock in primary school enrolment (PSE) leads to negative change or effect on life expectancy (LEX). This implies that, literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) has recorded both positive or negative influence on life expectancy (LEX) in Nigeria during the period of the study.

Table 4.6: Impulse Response of Literacy Rate Proxied by Adult Literacy Rate (ALR)

Response of ALR:				
Period	LRGDP	LEX	ALR	PSE
1	0.033025 (0.23405)	0.295693 (0.21537)	1.098171 (0.17042)	0.000000 (0.00000)
2	1.111428 (0.50080)	0.568046 (0.41631)	-0.374475 (0.37058)	-0.804248 (0.37454)
3	-0.361853 (0.73785)	0.493917 (0.73197)	-0.471491 (0.69449)	-0.231562 (0.51610)
4	1.074980 (0.85977)	0.370339 (0.65675)	0.195345 (0.73703)	0.076629 (0.71976)
5	1.356240 (1.19570)	0.414287 (1.07610)	-0.386088 (0.97338)	-0.308115 (0.81166)
6	1.180417 (1.81971)	0.784359 (1.29983)	-0.770827 (1.15437)	-0.004677 (0.87708)
7	1.123657 (2.09683)	1.233493 (1.64827)	-0.412674 (1.36505)	-0.007215 (1.28921)
8	0.991890 (3.16169)	0.834596 (2.07613)	-0.299457 (1.64906)	-0.513260 (1.56047)
9	0.901486 (4.09901)	1.499834 (2.68087)	-0.374021 (1.99890)	-0.643899 (1.71628)
10	0.843592 (5.41125)	1.594809 (3.13047)	-0.007998 (2.72745)	-0.251849 (2.34514)

Cholesky Ordering: LRGDP LEX ALR PSE

Standard Errors: Monte Carlo (100 repetitions)

Source: Author’s computation using E-views 8

The results of the impulse response function in Table 4.6 and Figure 4.1 shows that, the response of literacy rate proxied by adult literacy rate (ALR) to an unexpected one standard deviation shock in economic growth proxied by the log of real gross domestic product (LRGDP) leads to positive change or effect on literacy rate (ALR) in the first two quarters, negative in the third quarter, thereafter it turned positive and increasing for the remaining periods. Meaning that, economic growth proxied by the log of real gross domestic product (LRGDP) is significant in influencing literacy rate (ALR) positively in Nigeria. When there is increase in growth rate of a country, the proportion of the population aged 15 and

older who are able to “read and write a simple statement on his or her everyday life” (i.e. adult literacy rate) will also increase.

Response of literacy rate (ALR) to an unexpected one standard deviation shock in life expectancy (LEX) leads to a positive change or effect on literacy rate (ALR) from the first to the tenth quarter. This implies that life expectancy (LEX) is significant in influencing literacy rate (ALR) in Nigeria. Since the life span of individuals (or a population) is high, they will invest some of their income in acquiring skill and knowledge, thereby increase literacy rate in a country.

Furthermore, the response of literacy rate (ALR) to an unexpected one standard deviation of its “own” shocks leads to positive change or effect in the first quarter, it has a negative effect in the second and the third quarter. Furthermore, it became positive in the fourth quarter before becoming negative again from the fifth to tenth quarter. The response of literacy rate (ALR) to an unexpected one standard deviation shock in primary school enrolment (PSE) leads to a negative change or effect in the second and the third quarter. Furthermore, it became positive in the fourth quarter before becoming negative again from the fifth to tenth quarter. This implies that primary school enrolment (PSE) has a negative influence on literacy rate (ALR) in Nigeria. This might be associated with low rate of student enrolled at a given level relative to the population of the age group who should be attending school at that level.

Table 4.7: Impulse Response of Primary School Enrolment (PSE)

Response of PSE:				
Period	LRGDP	LEX	ALR	PSE
1	1.161275 (0.86628)	-0.978585 (0.75427)	-1.199929 (0.68914)	3.619980 (0.47755)
2	1.303841 (1.57364)	-0.144361 (1.44060)	-2.048453 (1.45900)	3.334293 (1.30195)
3	2.415833 (2.13861)	1.270050 (2.17485)	-1.461827 (1.99898)	2.236905 (1.86977)
4	1.568204 (2.95670)	2.863787 (3.07157)	-1.317382 (2.33335)	0.281463 (2.30064)
5	-0.412737 (3.64593)	3.665889 (3.73821)	0.194893 (2.48264)	-0.655524 (2.66265)
6	-0.643677 (4.21846)	1.723897 (4.11152)	1.236328 (2.99062)	-1.176061 (3.26768)
7	-1.450822 (5.39164)	0.208659 (5.03865)	0.446010 (3.20583)	-1.413626 (3.74329)
8	-1.153013 (6.62646)	-0.631650 (5.37535)	0.469657 (3.71633)	-0.210660 (4.17671)
9	-0.291976 (8.69947)	-1.140716 (7.08445)	0.329349 (4.19159)	0.248371 (4.38199)
10	0.586128 (11.6140)	-1.212004 (9.18606)	0.008932 (5.32067)	-0.029546 (5.45759)

Cholesky Ordering: LRGDP LEX ALR PSE

Standard Errors: Monte Carlo (100 repetitions)

Source: Author’s computation using E-views 8

The results of the impulse response function in Table 4.7 and Figure 4.1 shows that, the response of primary school enrolment (PSE) to an unexpected standard deviation shock in economic growth proxied by the log of real gross domestic product (LRGDP) leads to a positive change or effect on primary school enrolment (PSE) from the first four quarters, then became negative from the fifth to ninth quarters but in the tenth quarter it became negative again. This implies economic growth (LRGDP) initially has a positive significant influence on primary school enrolment (PSE) in Nigeria but from the fifth quarter up to the ninth, economic growth (LRGDP) begins to have negative effect on primary school enrolment (PSE) and this might be attributed to population growth that is left unchecked which makes per

capita growth rate to have less or no significance on primary school enrolment (PSE) in Nigeria during the period of the study.

Response of primary school enrolment (PSE) to an unexpected one standard deviation shock in life expectancy (LEX) leads to a negative change or effect on primary school enrolment (PSE) in the first two quarters but from the third to the seventh quarters, an unexpected standard deviation shock in life expectancy (LEX) leads to a positive change or effect on primary school enrolment and then negative in the eighth to tenth quarter. Meaning that, life expectancy (LEX) at some point (first two quarters, eight, ninth and tenth quarters) did not have negative influence on primary school enrolment (PSE) but also have a significant positive influence (from the third up to the seventh quarters) on primary school enrolment (PSE) in Nigeria during the period of the study.

The result further revealed that, response of primary school enrolment (PSE) to an unexpected standard deviation shock in literacy rate proxied by adult literacy rate (ALR) leads to a negative change or effect on primary school enrolment (PSE) from the first four quarters, but in the fifth quarter to the tenth quarter, an unexpected one standard deviation shock in literacy rate (ALR) leads to a positive change or effect on the primary school enrolment. Meaning that, literacy rate (ALR) did not only have a negative influence on primary school enrolment (PSE) but it also has significant positive influence on primary school enrolment from the fifth quarter up to the tenth quarter in Nigeria during the period. The response of primary school enrolment (PSE) to an unexpected one standard deviation of its “own” shocks leads to a positive change or effect on primary school enrolment (PSE) in the first quarter up to the fourth quarter but from the fifth quarter to the eighth quarter, an unexpected one standard deviation in its “own” shock leads to a negative change or effect on primary school enrolment (PSE). While in the ninth and the tenth quarter, a standard deviation “own” shock in primary school enrolment (PSE) leads to a positive and negative change or effect respectively.

4.4.2 Analysis of Forecast Error Variance Decomposition

The variance decomposition is used to aid in the interpretation of a Vector Autoregressive (VAR) model once it has been fitted. The variance decomposition indicates the amount of information each variable contributes to the other variables in the autoregression. It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables (Lutkepohl, 2007)

Table 4.8: Variance decomposition of economic growth proxied by the log of real gross domestic product (LRGDP)

Variance Decomposition of LRGDP:

Period	S.E.	LRGDP	LEX	ALR	PSE
1	0.077624	100.0000	0.000000	0.000000	0.000000
2	0.122041	91.48242	2.978441	5.523631	0.015510
3	0.154385	84.07264	5.673129	9.377930	0.876300
4	0.181109	79.05944	8.185251	9.682749	3.072560
5	0.205179	74.81109	11.55582	8.551668	5.081422
6	0.237474	67.31503	20.81865	6.731538	5.134787
7	0.270580	62.35327	27.24693	5.422105	4.977695
8	0.307657	56.41318	32.83587	5.174396	5.576553
9	0.345723	51.46576	38.03350	4.870304	5.630440
10	0.383336	47.41063	42.59590	4.579904	5.413561

Cholesky Ordering: LRGDP LEX ALR PSE

Source: Author’s computation using E-views 8

The variance decomposition of economic growth proxied by the log of real gross domestic product (LRGDP) in Table 4.8 shows that, variance error decomposition of economic growth proxied by the log of real gross domestic product (LRGDP) has explained 100 percent and 47 percent variations of it owns shocks in the 1st and 10th periods respectively. In the 1st period life expectancy (LEX), literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) recorded zero (0.00) of the forecast error variances of economic growth apart from the economic growth explaining its own shocks. Innovation in life expectancy (LEX) has explained 11.56%, 32.83% and 42.59% forecast error variance of the economic growth (LRGDP) in the 5th, 8th and 10th quarters respectively. Meaning that life expectancy (LEX) is significant in influencing economic growth (LRGDP) in Nigeria. While on the other hand, innovation in literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) has explained 8.55%, 5.17%, 4.58% and 5.08%, 5.58%, 5.41 forecast error variance of economic growth (LRGDP) in the 5th, 8th, and 10th quarters respectively.

Table 4.9: Variance decomposition of life expectancy (LEX)

Variance Decomposition of LEX:

Period	S.E.	LRGDP	LEX	ALR	PSE
1	0.954258	3.801051	96.19895	0.000000	0.000000
2	1.118742	8.756414	89.24355	1.395352	0.604686
3	1.317438	8.062053	83.00191	5.606965	3.329076
4	1.391063	9.532263	81.95193	5.529797	2.986014
5	1.437876	8.958060	80.53383	7.655130	2.852977
6	1.450797	8.799970	80.76733	7.618481	2.814215
7	1.485686	11.34092	78.70847	7.264948	2.685659
8	1.507178	11.54538	78.11512	7.285314	3.054192
9	1.520046	11.70757	77.49779	7.425529	3.369114
10	1.533389	11.75964	76.25067	7.628609	4.361084

Cholesky Ordering: LRGDP LEX ALR PSE

Source: Author's computation using E-views 8.1, 2018

The variance decomposition of life expectancy (LEX) in Table 4.9 shows that, variance error decomposition of life expectancy (LEX) has explained 96.20% and 76.25% variations of its own shocks in the 1st and 10th quarters respectively. At 1st quarter, apart from innovation in life expectancy (LEX), innovations in economic growth proxied by the log of real gross domestic product (LRGDP), literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) has explained 3.80%, 0.00% and 0.00% forecast error variance in life expectancy (LEX) respectively in Nigeria. Innovations in economic growth proxied by the log of real gross domestic product (LRGDP) has explained 8.10% and 11.76% forecast error variance of life expectancy (LEX) in the 5th and 10th quarters respectively in Nigeria. Innovations in literacy rate proxied by adult literacy rate (ALR) has explained 7.66% and 7.63% forecast error variance of life expectancy (LEX).

The result further revealed that, innovations in primary school enrolment (PSE) has explained 2.85% and 4.36% forecast error variance of life expectancy (LEX). This implies that apart from life expectancy (LEX) own shocks, economic growth proxied by the log of real gross domestic product (LRGDP) is more important in influencing life expectancy (LEX) than literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE).

Table 4.10: Variance decomposition of literacy rate proxied by adult literacy rate (ALR)

Variance Decomposition of ALR:

Period	S.E.	LRGDP	LEX	ALR	PSE
1	1.137762	0.084252	6.754274	93.16147	0.000000
2	1.907746	33.97069	11.26832	36.98890	17.77209
3	2.071307	31.86947	15.24513	36.55942	16.32598
4	2.372146	44.83467	14.06086	28.55253	12.55194
5	2.807507	55.34402	12.21564	22.27499	10.16534
6	3.238039	54.89471	15.05087	22.41234	7.642077
7	3.665973	52.22168	23.06340	18.75246	5.962457
8	3.933556	51.71702	24.53407	16.86750	6.881413
9	4.369158	46.17597	31.66983	14.40462	7.749573
10	4.733719	42.51333	38.33008	12.27164	6.884949

Cholesky Ordering: LRGDP LEX ALR PSE

Source: Author's computation using E-views 8

The variance decomposition of literacy rate proxied by adult literacy rate (ALR) in Table 4.10 shows that, variance error decomposition of literacy rate proxied by adult literacy rate (ALR) has explained 93.16% and 12.27% variations of it owns shocks in the 1st and 10th quarters respectively. At the 1st quarter, apart from innovations in literacy rate proxied by adult literacy rate (ALR), innovations in economic growth (LRGDP), life expectancy (LEX) and primary school enrolment (PSE) explained 0.08%, 6.75% and 0.00% forecast error variance of the literacy rate proxied by adult literacy rate (ALR) in Nigeria. From quarter 4th to 10th economic growth is more important in explaining the error variance of literacy rate (ALR) than the literacy rate itself. Where economic growth (LRGDP) explained 44.83% and 42.51% in the 4th and 10th quarters respectively relative to the contribution of literacy rate (ALR) of 28.55% and 12.27% for the same period.

Innovations in life expectancy has explained 23.06% and 38.33% forecast error variance of literacy rate (ALR) in the 7th and 10th quarters respectively and this is greater than the contributions of literacy rate (ALR) of 18.75% and 12.27% for the same period. Meaning that economic growth (LRGDP) and life expectancy (LEX) are significant in influencing the level of literacy rate proxied by adult literacy rate (ALR) in Nigeria during the period of the study. This tends to confirm the VAR granger causality test and impulse response functions findings of the significant effect of economic growth (LRGDP) and life expectancy (LEX) in explaining the level of literacy rate in Nigeria. The result further revealed that,

innovations in primary school enrolment (PSE) has explained 17.77% and 6.88% forecast error variance of the literacy rate proxied by adult literacy rate (ALR) in the 2nd and 10th quarter in Nigeria.

Table 4.11: Variance decomposition of primary school enrolment (PSE)

Variance Decomposition of PSE:

Period	S.E.	LRGDP	LEX	ALR	PSE
1	4.104908	8.003194	5.683161	8.544850	77.76880
2	5.821064	8.996841	2.887633	16.63281	71.48272
3	6.962381	18.32874	5.346074	16.03501	60.29018
4	7.807048	18.61210	17.70758	15.60037	48.07995
5	8.661800	15.34709	32.29714	12.72400	39.63177
6	9.018013	14.66807	33.45033	13.61817	38.26343
7	9.255822	16.38099	31.80436	13.15958	38.65508
8	9.362885	17.52502	31.53629	13.11196	37.82673
9	9.445648	17.31481	32.44452	13.00477	37.23590
10	9.541159	17.34727	33.41184	12.74580	36.49509

Cholesky Ordering: LRGDP LEX ALR PSE

Source: Author’s computation using E-views 8

The variance decomposition for primary school enrolment (PSE) in Table 4.11 shows that, variance error decomposition of primary school enrolment (PSE) has explained 77.77% and 36.50% variations of it owns shocks in the 1st and the 10th quarter respectively in Nigeria. In the 1st quarter apart from the innovations in primary school enrolment (PSE), economic growth proxied by the log of real gross domestic product (LRGDP), life expectancy (LEX) and literacy rate proxied by adult literacy rate (ALR) have respectively explained 8.00%, 5.68% and 8.54% forecast error variance of primary school enrolment in Nigeria. Innovations in economic growth (LRGDP) has explained 15.35%, 16.38% and 17.35% forecast error variance of the primary school enrolment (PSE) in 5th, 7th and 10th quarters respectively.

Innovations in life expectancy (LEX) and literacy rate (ALR) has explained 32.30%, 31.80%, 33.41% and 12.72%, 13.16%, 12.75% forecast error variance of the primary school enrolment (PSE) in the 5th, 7th and 10th quarters respectively in Nigeria. Meaning that apart from the own shocks of primary school enrolment (PSE), only life expectancy (LEX) that has more influence on primary school enrolment (PSE) followed by economic growth proxied by the log of real gross domestic product (LRGDP) and literacy rate (ALR) in influencing primary school enrolment in Nigeria during the period.

5.0 Conclusion and Recommendations

This study examined the effect of human capital development on economic growth in Nigeria from 1981 to 2016. The descriptive statistics test result revealed that, economic growth proxied by real gross domestic product (RGDP) has an average value of $3.27E+13$ over the period. It has a maximum value of $6.98E+13$ and the minimum value is $1.52E+13$. Life expectancy (LEX) has an average of 53.0 while the maximum value is 54.0 and the minimum value is 51.0 in Nigeria during the period under study. Furthermore, the result also shows that literacy rate proxied by adult literacy rate (ALR) has an average value of 59.0, the maximum value of 66.9 and a minimum value of 54.0 during the period. Finally, Primary school enrolment (PSE) has an average of 94.1, maximum value of 112.8 and the minimum value of 78.5 in Nigeria. Based on correlation test result, there is a weak positive correlation between economic growth proxied by real gross domestic product (RGDP) and life expectancy (LEX). A strong positive correlation also exists between economic growth and literacy rate proxied by adult literacy rate (ALR). The result also revealed a weak negative correlation between economic growth (RGDP) and primary school enrolment (PSE) in Nigeria during the period of the study. Life expectancy (LEX) has a weak positive correlation with literacy rate proxied by adult literacy rate (ALR). A weak positive correlation also exists between life expectancy (LEX) and primary school enrolment (PSE). Finally, there exist a weak negative correlation between literacy rate proxied by adult literacy rate (ALR) and primary school enrolment (PSE) in Nigeria.

Furthermore, Impulse Response test result revealed that, life expectancy (LEX) has positive effect on economic growth (LRGDP) from the first quarter to the tenth quarter. Literacy rate proxied by adult literacy rate (ALR) has positive effect on economic growth (LRGDP) in the first quarter and then negative in the second quarter up to the tenth period. The response of economic growth proxied by the log of real gross domestic product (LRGDP) to an unexpected one standard deviation shock in primary school enrolment (PSE) leads to a positive change or effect on economic growth (LRGDP) in the first quarter but from the second quarter up to the tenth quarter, an unexpected one standard deviation shock in primary school enrolment (PSE) leads to a negative change or effect on economic growth (LRGDP).

Based on the findings of this study, it is recommended that, since life expectancy term of human capital was found to have a positive effect on economic growth in Nigeria during the period, government should as a matter of priority implement the minimum United Nations recommendation of 20% budgetary allocation on health so as to help improve the existing life expectancy for a productive economy. The policy makers should also make policies and programmes that is geared towards improving the per capita income because an increase in per capita income will lead to an increase in the standard of living. Literacy rate and primary school enrolment is said to have no any positive effect on economic growth in Nigeria, relevant policies and programmes such as unconditional cash transfers (UCTs) which are standard welfare programmes for schools in which beneficiaries qualify on the basis of some

characteristics rather than behaviour or some conditions as a requirement of getting the benefit should be made in order to increase rate of effectiveness of both literacy rate and primary school enrolment so that they will have positive effect on economic growth. The primary school feeding programme should be implemented at all levels of government. Also, government should as a matter of priority implement the minimum United Nations recommendation of 26 percent budgetary allocation on education so as to increase the growth rate. Donor agencies like the World Bank, UNDP, UNESCO, etc. should also be encouraged to inject funds into education sector in order to foster quick growth in the economy and later development.

References

- Adejebi, S. O., & Bamidele, R. O. (2003). Economic Impact of Tertiary Education on Human Capital Development in Nigeria. *Human Resource Development in Africa. 2002 Annual Conference* (pp. 499-522). Nigerian Economic Society.
- Adejumo, A. V., Olamola, P. A., & Adejumo, O. O. (2013). The Role of Human Capital in Industrial Development: The Nigerian case (1980-2010). *Journal of Modern Economy*, 4(1): 639-651. Retrieved on 6th July, 2017 from <http://www.scirp.org/journal/me>
- Adeyemi, P. A., & Ogunsola, A. J. (2016). The Impact of Human capital Development on Economic Growth in Nigeria: ARDL Approach. *Journal of Humanities and Social Science*, 21(3): 1-7. Retrieved on 6th July, 2017 from <http://www.iosrjournals.org>
- Akingbade, B. (2006). *Meeting the Challenges of Human Capital Development in Nigeria: The Case of Reforms in our Educational Policies and System*. Being Paper Presented by CMO of MTN at the Alumni Convocation Lecture of the University of Nigeria Nsuka.
- Anyanwu, S. O., Adams, J. A., Obi, B., & Yelwa, M. (2015). Human Capital Development and Economic Growth in Nigeria. *Journal of Economics and Sustainable Development*, 6(14): 16-26. Retrieved on 6th July, 2017 from www.iiste.org
- Atoyebi, K. O., Olaleye, S. O., Ishola, A. S., Adekunjo, F. O., & Kadiri, K. I. (2013). Human Capital and Economic growth in Nigeria (1970-2010): An Empirical Analysis. *International Journal of Humanities and Social Science Invention*, 2(2):58-69. Retrieved on 6th July, 2017 from <http://www.ijhssi.org>

- Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. National Bureau of Economic Research. New York; 2nd edition, NBER, New York, 1975; 3rd ed, University of Chicago Press, Chicago, 1993.
- Bleakley, H. (2010). "Health, Human Capital, and Development". *Annual Review of Economics* 2(3): 283-310.
- Bloom, D. E, Canning, D., Sevilla J. (2001). *The Effect of Health on Economic Growth: Theory and Evidence*. NBER Working Paper No 8587.
- Central Bank of Nigeria (1985). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (1990). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (1995). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (2000). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (2005). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (2010). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (2015). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (2016). *Annual Report and Statement of Account*. Central Bank of Nigeria Research Department press
- Central Bank of Nigeria (2016). *Annual Statistical Bulletin*. Central Bank of Nigeria Statistical Department press
- Dagum, C., & Slottje, D. J. (2000). A New Method to Estimate the Level and Distribution of the Household Human Capital with Application. *Structural Change and Economic Dynamics*, 11(3): 67-94.

- Dauda, R. O. (2010). Investment in Education and Economic Growth in Nigeria: An Empirical Evidence. *International Research Journal of Finance and Economics*, 55(3): 158-169.
- Eigbiremolen, G. O., & Anaduaka, U. S. (2014). Human Capital Development and Economic Growth: The Nigerian Experience. *International Journal of Academic Research in Business and Social Sciences*, 4(4): 25-35. Retrieved on 6th July, 2017 from <http://dx.doi.org/10.6007/IJARBS/v4-i4/749>
- Ejere, S. I. (2011). Human Capital Development as Catalyst for National Development: Nigeria in Perspective. *International Business and Management Journal*, 2(2): 98-104.
- Fuchs, V. R. (1966). Economic Aspects of Health, Time preference and health: an exploratory study, In Fuchs, V. R. (ed) National Bureau of Economic Research, New York, p. 93–120.
- Glaeser, E. L., Kolko, J., & Saiz, A. (2001). Consumer city. *Journal of economic geography* 1(1): 27-50
- Grossman, M. (1972). The Human Capital Model of Demand for Health. NBER Working Paper No.7078, [Online]. Retrieved on 6th July 2017 from: <http://www.nber/w7078>.
- Harbison, F. H. (1973). *Human Resource as the Wealth of Nations*. New York: Oxford University Press.
- Idrees, A. S., & Siddiqi, M. W. (2013). Does public education expenditure cause economic growth? Comparison of develop and developing countries. *Pakistan journal of commerce and social science* 7(1): 174-183.
- Ilegbinosa, I. A. (2013). Human Capital Investment as an Effective Tool for Economic Development in Nigeria. *International Journal of Management and Business Studies*, 3(1): 7-13. Retrieved on 6th July, 2017 form <http://www.ijmbs.com>
- Kendrick, J. (1976). *The Formation and Stock of Total Capital*. New York: Columbia University Press for NBER.
- Kiker, B. F. (1966). The Historical Root of the Concept of Human Capital. *Journal of Political Economy*, 74(5): 481-499.
- Le, T., Gibson, J., & Oxley, L. (2005). Cost and Income Based Measure of Human Capital. *Journal of Economic Survey*, 17(3): 271-307.
- Lucas, R. E., (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics* 22(4): 3-42

- Machlup, F. (1962). *The Production and Distribution of Knowledge in the United State, Princeton, N.J.* Princeton: Princeton University Press.
- Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107(4): 407-438.
- Moretti, E. (2004). *Human Capital Externalities in Cities*. Handbook of Urban and Regional Economics, North Holland-Elsevier
- Mushkin, S. J. (1962). Health as an Investment. *Journal of Political Economy*. 70(5): 129-157.
- OECD, (1996). *Knowledge Based Economy*. Paris: Organization for Economic Cooperation and Development (OECD) Publishers.
- OECD, (2001). *The Well-Being of Nations: The Role of Human and Social Capital, Education and Skills*. Evaluative Report: OECD, Paris (France).
- Okojie, C. E. (1995). Human Capital Formation for Productivity Growth in Nigeria. *Nigerian Economic and Financial Review*, 1(6): 44-55.
- Okojie, O. O. (2005). Health Promotion Perception among Community Pharmacists in Nigeria. *International Journal of Pharmacy practice*, 13(3): 213-221
- Oladeji, S. I., & Adebayo, A. A. (1996). "The Scope for Human Resource Development Under the Adjustment Programme in Nigeria". *Nigerian Economic Society Annual Conference Publication* (pp. 441-460). Nigerian Economic Society.
- Omotayo, O. A. (2015). Impact of Human Capital development on Economic Growth in Nigeria. *International Journal of Recent Research in Commerce, Economics and Management*, 2(2): 151-164. Retrieved on 6th July, 2017 from <http://www.paperpublications.org>
- Qian, H., Acs, Z. J., & Stough, R. (2012). Regional System of Entrepreneurship: Nexus of human capital, Knowledge and New Firm Formation. *Journal of Economic Geography* 1(1): 112-149
- Romer, P. (1996). Why, indeed, in America? Theory, History and the Origins of Modern Economic Growth. *American Economic Review*, 86(2): 202-206.
- Sankay, O. J., Ismail, R., & Shaari, A. (2010). The Impact of Human Capital Development on the Economic Growth of Nigeria. *Prosiding perkem V, Jilid*, 1(1): 63-72.
- Schultz, T. W. (1961). Investment in Human Capital. *American Economic Review*, 3(1): 1-17.

- Schultz, T. W. (1962). Investment on Human Capital. *American Economic Review*, 51(1): 1-17.
- Schultz, T. W. (1993). The Economic Importance of Human Capital in Modernization. *Educational Economics*, 1(1): 13-19.
- Sede, P. I & Ohemeng, W. (2015). Socio-economic Determinant of Life Expectancy in Nigeria (1980-2011). *Health Economics Review*, 5(2): 1-5.
- Sims C. A (1998): Comment on Glenn Redebusch's "Do measures of monetary policy in a VAR make sense?" *International Economic Review*, 39(4):933-941
- Smith, A. (1776). *An Enquiry into the Nature and Causes of Weath of Nations* . London: Oxford Paperbacks Publishers.
- Solow, R. M (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1): 65-94. Retrieved on 6th July, 2017 from <http://www.jstor.org>
- UNDP, (2015). *The Real Wealth of Nations: Pathway to Human Development*. New York, USA: Palgrave Macmillan Publishers.
- Victoria, C. G., Adair, L., Fall, C., Hallal, P. C., Martorell, R., Richter, L & Sachder, H. S. (2008). Maternal and child under nutrition: consequences for adult's health and human capital. *Lancet* 371(9609):340-357
- World Bank. (2015). *World Development Report*. New York: Oxford University Press.
- World Bank (2017). World Development Indicators, Data Base