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Health as a Component of Human Capital Formation: Does it Matter for the Growth of the Nigerian Economy?

LA SANTE EST UNE COMPOSANTE DE LA FORMATION DU CAPITAL HUMAIN: EST-CE DERNIER EST IMPORTANT DANS LA CROISSANCE DE L'ECONOMIE NIGERIENNE?

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Abstract

This paper tries to examine whether health as a component of human capital matters for the growth of the Nigerian economy. The study employs annual time series data from 1970 to 2009. The unit root test result indicates that all the variables except one were stationary at first difference, which also implies a I(1) while the result of the cointegration analysis reveals six cointegrating equations. Accordingly, the study employs the error correction mechanism which helps to determine the short run dynamics of the cointegrated variables towards their equilibrium. The results of the study show that health expenditure is positive and statistically significant but the coefficients of the second and third lags are negative and statistically significant. Infant mortality is significant and has negative coefficient. Life expectancy is positive and statistically significant at the first difference and difference of the second lag. The control variables such as gross fixed capital formation, education expenditure and labour force were all significant. The ECM variable is negative, less than one in absolute term and statistically significant with the coefficient of 40%, implying that the speed of adjustment or convergence to equilibrium is 40%. The model demonstrates a good fit. This is evident from the adjusted R2 of 97%, showing that the explanatory power of the model is strong with the independent variables explaining 97 percent of variation in gross domestic product. The Durbin-Watson statistic of 3.15 falls within the acceptable range of no autocorrelation. The main conclusion from the study is that health as a component of human capital formation matters for the growth of the Nigerian economy. The policy implication of the study is that the Nigerian government should in addition to increasing expenditure on health put in place mechanism to monitor how effectively such funds are utilized for the purposes for which they are meant. All efforts as a matter of fact should also be geared towards combating the menace of communicable diseases such as HIV/AIDS, malaria and tuberculosis in order to improve the health status of the population, reduce infant mortality and improve life expectancy.

Key words: Human capital; Economic growth; Health; Life expectancy

Résumé

Cet article tente d'examiner si la santé est une composante comme le capital humain pour la croissance de l'économie nigérienne. L'étude emploie des données annuelles sur des séries chronologiques de 1970 à 2009. Le résultat du test de racine unitaire indique que toutes les variables sauf une étaient stationnaires au premier abord différence, ce qui implique également un I (1) tandis que le résultat de l'analyse de cointégration révèle six équations de cointégration. En conséquence, l'étude utilise le mécanisme de correction d'erreur qui aide à déterminer la dynamique à court terme des variables cointégrées vers leur équilibre. Les résultats des l'étude montrent que les dépenses de santé est positif et statistiquement significatif, mais les coefficients des décalages deuxième et troisième sont négatifs et statistiquement significatifs. mortalité infantile est importante et a coefficient négatif. espérance de vie est positif et statistiquement significatif à la première différence et la différence des lag secondes. Les variables de contrôle telles que la formation brute de capital fixe, les dépenses d'éducation et de la population active étaient tous significatifs. La variable ECM est négatif, moins d'un terme absolu et statistiquement significative avec le coefficient de 40%, ce qui implique que la vitesse d'ajustement ou de convergence vers

l'équilibre est de 40%. Le modèle montre un bon ajustement. Ceci est évident à partir du R2 ajusté de 97%, montrant que le pouvoir explicatif du modèle est forte avec les variables indépendantes expliquent 97 pour cent de la variation du produit intérieur brut. La statistique de Durbin-Watson de 3,15 se situe dans la fourchette acceptable d'absence d'autocorrélation. La principale conclusion de l'étude est que la santé comme une composante de la formation du capital humain des questions pour la croissance de l'économie nigériane. L'implication politique de l'étude est que la gouvernement nigérian devrait, en plus d'augmenter les dépenses de santé mis en place un mécanisme pour surveiller l'efficacité de tels fonds sont utilisés aux fins pour lesquelles ils sont destinés. Tous les efforts comme une question de fait doivent également être orientées vers la lutte contre la menace de maladies transmissibles telles que le VIH / sida, le paludisme et la tuberculose afin d'améliorer l'état de santé de la population, réduire la mortalité infantile et améliorer l'espérance de vie.

Mots-clés: Capital humain; Croissance économique; Santé; Espérance de vie

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INTRODUCTION

The importance of human capital in fostering growth and development has continued to occupy a prominent place not only in the literature but also among governments, policy makers and the civil society. Seeing the wonders human capital can perform in development process, most developed countries such as the United States, Japan and some emerging economies like Singapore, Taiwan, China and so on have continued to invest rigorously in human capital development. The results of this are obvious in the great improvements that are witnessed today by the economies of these countries. Little wonder Professor Galbraith remarks on America's economy that, "we now get the larger part of our industrial growth not from more capital investment but from investment in men and improvements brought about by improved men" (Galbraith, 1960).

Although, a general consensus exists in the literature that human capital is a crucial driver of economic outcomes but most literatures focus on education as the important component of human capital. This is supported by Bloom, Canning & Sevilla (2001) in their assertion that "macroeconomists acknowledge the contribution of human capital to economic growth, but their empirical studies define human capital solely in terms of schooling." Until recently, investment in education and training were seen as the only means of developing human resource for better economic performance. Little or no attention was paid to health; but there is no doubt that health as a component of human capital is very vital for growth and development. Since the work of Grossman (1972a&b) on the demand for good health as a commodity, attention has shifted on the strategic importance of health in human capital formation and its contribution to economic growth and development. Studies have shown that a strong correlation exists between health status and individual's level of productivity. Good health increases labour force participation which invariably would translate into higher productivity and GDP growth.

Empirical evidence has shown that investing in health improves economic outcomes while the level of income also determines health status. This implies that there seems to be a bi-directional or reverse causality between health and economic growth. This is due to the fact that "higher income levels allow greater access to inputs that improve health, such as food, clean water and sanitation, education, and medical care"(Bloom and Canning, 2008). Although, Bloom and Canning (2008) have argued that the two-way causality relationship between health and growth poses a great difficulty in measuring the economic impact of health yet different studies have been conducted using different measures of heath on growth with appreciable significant results. This study focuses exclusively on health impact on growth in order to determine whether or not health matters for the growth of the Nigerian economy.

The empirical evidence of positive and significant long-run relationship between health and economic growth is not in doubt, this notwithstanding, can we conclude that health matters for economic growth in Nigeria? This question becomes pertinent because the country continues to experience growth in the GDP level in spite of health challenges from communicable diseases such as malaria, HIV/AIDS, tuberculosis, and others which contribute to high morbidity and mortality rate in the country as well as low life expectancy. To answer this question, it is pertinent to consider the performances of the different relevant indicators of economic growth and health in the Nigerian context.

Although, the GDP level of Nigeria has witnessed some fluctuations over the years but there is no doubt that it has maintained some level of increase. For instance, available IFS statistics indicate that Nigeria's real GDP growth rate in 1980 was 5.34 percent, 8.44 percent in 1990, 3.71 percent in 2000 and in 2003 it was 3.78 percent. In addition, the Central Intelligence Agency (CIA) figure reveals that the nation's real GDP growth rate in 2004 stood at 7.1 percent, 6.2 percent in 2005, 6.9 percent in 2006 and in 2007, it fell to 5.3 percent. It later rose to 6.4 percent in 2008 and then fell to 5.3 percent in 2009. The rate in 2010 stands at 6.1 percent. Although the growth

rates fluctuate yet they are all positive figures which potent good omen for the country.

The life expectancy of the nation since 1960 till date has increased just marginally. For instance, it has ranged between 36 years in 1960 and 48years in 2009. This indicates the Nigerian life expectancy has not really witnessed much improvement not even with the level of health expenditures over the years. It is on this note that the question becomes relevant of whether health as a component of human capital matters for the growth of the economy of Nigeria. Government expenditure on health seems to have little impact on life expectancy considering its low level since independence. In fact, mortality and the morbidity rates among both adults and children have continued to steer the country in the face and yet, the economy has persisted to record high growth rate. The two-way causality that exists between income level and health status is expected to have led to improved health status of the Nigerian population considering the level of growth of the nation's GDP since theoretically, health as an outcome is influenced by income level and conversely health status influences the level of income. The case of Nigeria seems to be paradoxical; this is because as the level of her GDP increases, so also communicable diseases as well as morbidity and mortality within the economy. All these act to elicit the question of whether health matters for the growth of the economy of Nigeria. It is a big question that remains unanswered in the literature and requires more researches.

This study aims to determine whether health as a component of human capital matters for the growth of the Nigerian economy. In view of this, the study attempts to measure the impact of health on the economic growth of Nigeria using government total health expenditure, infant mortality and life expectancy. The study is justified on the basis that studies on economic growth and health related issues on Nigeria are scarce to come by. Most studies on human capital and growth on the country focus on education as a measure of human capital formation. One of the reasons is attributed to the convenience in measuring educational expenditure as against health care expenditure (Jhingan, 2005). And in addition, different variables are employed as proxies for health measurement. While some use expenditure on health, others use life expectancy, adult survival rate or child/infant mortality. Few studies on health related issues take little or no stand on how the health of the Nigerian population has imparted the performance of her economy. In a paper titled "Human Capital Investment and Economic Development in Nigeria: The Role of Education and Health" and presented at the Oxford Business and Economic Conference programme in 2009, Lawanson, using government expenditure on health as a proxy for health capital and with a data set spanning the period of 25 years found a negative and insignificant relationship between health and economic growth.

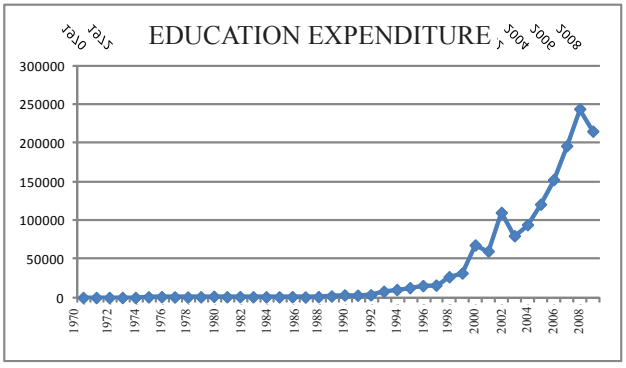
In an interim research report submitted to the African Economic Research Consortium (AERC) on Human Capital, Capabilities and Poverty in Rural Nigeria, Olaniyan and Bankole (2005) reported that increasing the human capital of individuals would redress poverty situation in the rural area of Nigeria. Although the study reviewed health as one of the components of human capital but the findings reported/suggested increasing human capital through provision of adequate education only to individuals in rural areas of Nigeria without any mention of health services.

In this study, we use life expectancy, infant mortality and government expenditure on health as proxies for health capital to determine whether or not health as one of the components of human capital formation matters for the growth and development of the Nigerian economy. In addition, other control variables such as labour force, educational expenditure and gross physical capital formation were also used. The rest of this paper is organized as follows: Section two provides background information on human capital situation in Nigeria, section three presents a review of related literature, section four gives the methodology, section five presents result and section six gives conclusion and policy recommendations.

1. HUMAN CAPITAL FORMATION: NIGERIA'S EXPERIENCE

Nigeria's attempt to show more commitment to investment in human capital began in 1959, the year preceding her political independence when Ashby Commission was set up "to conduct an investigation into Nigeria's needs in the field of post-school certificate and higher education for the subsequent 20 years" (Ojo, 1997). The report of the commission which was submitted in 1960 with the contribution of a leading and seasoned expert in human resource matters, Frederick Harbison, led to massive investment in education which was seen then as the only means of human capital formation. Prior to this period, investment in formal education was more of private affairs which also extended to the works of the Christian missionaries in the colonial era (Okuwa, 2004). Obadara (2010) affirms that as at 2010, the number of Nigerian Universities was one hundred and one (101) categorized into twenty-seven (27) federal universities, thirty-three (33) state universities and forty-one (41) private universities. According to him, the staff strength of these universities is 99, 464 divided into 27, 394 teaching staff and 72, 070 non-teaching staff. Quoting Okojie (2009), Obadara gave the total students enrolment in Nigerian universities as at 2009 as 1, 096,312. Since 1960, government expenditure on education continues to increase, although it has not yet met the 26 percent UNESCO recommendation. All these are indication of

commitment on the part of the Nigerian government to develop her human resource. In addition, as at 2010, the federal government of Nigeria approved six more federal Universities to be sited in each of the six geopolitical zones of North-West, North-East, North-Central, South-East, South-West and South-South. Furthermore, additional Private Universities had also been licensed and more are still expected to be given licence since the number of students seeking admission to tertiary institutions is on the increase in the country. Expenditure on education by the federal government of Nigeria has continued to show some increasing trend over the years. The graph below provides a visual picture of federal government education expenditure.

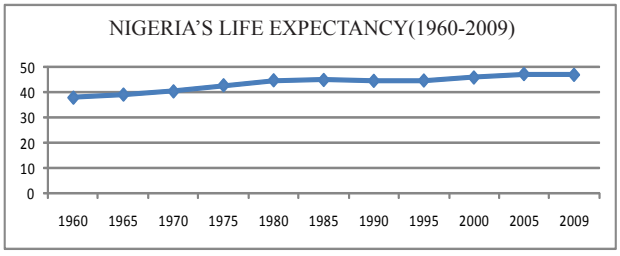


Source: Generated by the author based on data from the Central Bank of Nigeria, Annual Report and Statement of Accounts (various issues).

Figure 1
Federal Government Expenditure on Education

Since the focus of this study is more of health than education, it is pertinent to consider how Nigeria has been performing in terms of investment in health and some health indicators. Nigeria, which is the largest country in Sub-Saharan Africa and an oil-rich country, has continued to experience health problems in the form of high rates of infant and maternal mortalities due to prevalence of different diseases, increase in morbidity rate which has resulted to low life expectancy coupled with poor macroeconomic performance in spite of high foreign exchange earnings from the crude oil. In the 1960s and early 1970s, Nigeria was among the richest 50 countries of the world and one of the promising economies in Africa, but today, the country is beset with high level of poverty, increased crime rate, high cost of living, low average life expectancy, high rate of communicable diseases and increase in the level of corruption. A lot of money has been spent on the health sector, but the most pressing issue has to do with whether such expenditures have any significant impact on the health of the nation's population and whether they have translated into the growth of the economy. In Nigeria, health delivery services are provided not only by the three tiers of the government, i.e. Federal, State and Local Governments, but also by religious organizations, Missionaries, Corporate Organizations, Private Agencies and Individuals. All these notwithstanding, cases of diseases continue to increase.

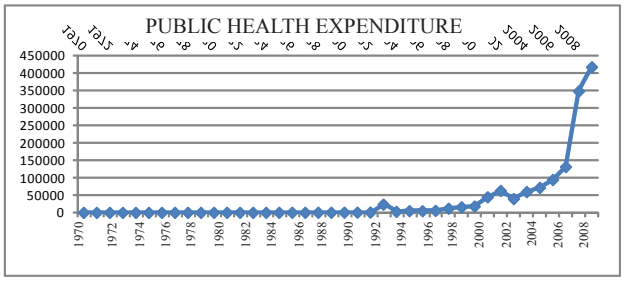
Considering the indices of health status of Nigeria, there seems to be some fluctuations since independence. Taking life expectancy for example, data from the World Development Indicators (WDI) show that in 1960, the country's life expectancy was 38 years, by 1970, it has increased marginally to 40 years. It rose to 45 years in 1980, and by 1990 which was ten years after, it still remained at 45 years. There was a marginal increase by 2000 to 46 years and by 2005, it was given as 47 years. It still remained at 47 years by 2009 notwithstanding the huge expenditure by the government on health. Below is a graphical representation of Nigeria's life expectancy from 1960 to 2009.



Source: Generated by the Author from data provided by the World Development Indicators

Figure 2
Nigeria's Life Expectancy

Public total health expenditure in the 1970s witnessed fluctuating trend. In 1970, it stood at 11.9 million naira. It increased to N223.6 million in 1977 but by 1979 it had declined to N183.7 million. It rose to N302.5 million in 1980 and thereafter continued to fluctuate with a declining trend until 1986 when it rose to N360.4 million. It stood at N6,58.1 million in 1990, N18,181.8 million in 2000 and N59,787.40 million in 2007. The figure below provides a graphical presentation of the nation's health expenditure.



Source: Generated by the author based on data from the Central Bank of Nigeria, Annual Report and Statement of Accounts (various issues)

Figure 3
Federal Government Total Health Expenditure (1970 – 2008)

In spite of the huge expenditure of the government on health related issues, reported cases of notifiable diseases have continued to increase in the country with malaria maintaining its most prevalent position. Table 1 below reported cases of notifiable diseases.

Table 1
Reported Cases from Notifiable Diseases

Year	Malaria	Tuberculosis	Cholera	Typhoid & Parathyphoid
1991	898230	19100	612567	8101
1992	219348	14082	8687	19003
1993	981943	11601	4160	11893
1994	1154725	14854	3171	22492
1995	1,133,726	10040	13384	26254
1996	1,423,533	24,558	46,445	37,606
1997	1,176,363	16,064	14,022	28,216
1998	2,122,663	19,368	9,254	68,846
1999	1,958,026	18,737	2,233	56,747
2000	2,388,096	18,570	6,354	78,580
2001	2,220,348	14,341	10,294	73,949
2002	2,535,430	15,175	23,417	95,332
2003	2,631,696	28,643	11,933	77,850
2004	3,109,166	23,382	13,522	39,337
2005	3,183,072	22,582	10,785	NA
2006	3,547,830	34,506	20,526	NA
2007	4,481,725	31,264	12,194	NA

Source: National Bureau of Statistics (Annual Abstract of Statistics), Nigeria, various issues

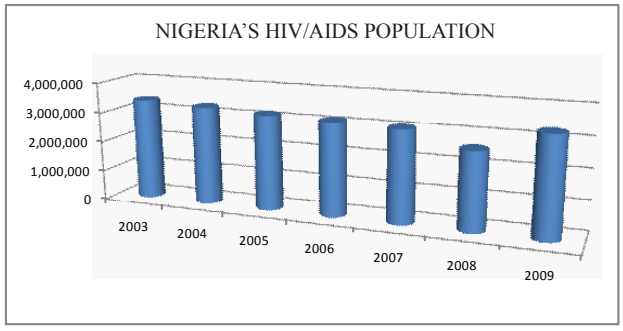
From the table, malaria continues to occupy its leading position with 898,230 cases reported in 1991; 1,133,726 in 1995 and by 2000 it has increased to 2,388,096. Between 2000 and 2007, the figure has risen to 4,481,725, which is about 87.7 percent increase. This is worrisome. Incidence of HIV/AIDS in Nigeria is also one of the greatest health challenges the country has been facing. As at 2009, Nigeria was the second nation in the world with the highest number of people infected with HIV/AIDS after South Africa (UNGASS country progress report, 2010) with the prevalence rate ranges between 4.6% and 5%. In 2008, about 2,600,000 Nigerians were reported to be living with the disease. Of this number, 1,400,000 were women and 220,000 children. The number of children rendered orphans due to AIDS was put at 1,200,000 UNAIDS (2009). The table below presents HIV/AIDS population in Nigeria.

Table 2
HIV/AIDS Population in Nigeria

Year	HIV/AIDS Population
2003	3,392,802
2004	3,295,862
2005	3,191,203
2006	3,138,854
2007	3,083,007
2008	2,600,000
2009	3,300,000

Source: Compiled by the Author from National Bureau of Statistics (Annual Abstract of Statistics), Nigeria, various issues; UNAIDS and WHO (2009); UNAIDS (2010) and US Global Health Policy, (2010)

From the table, it could be seen that the population of the people living with the virus since 2003 till 2009 has remained above three million people except in 2008 when it was 2.6 million people. These figures are still high in spite of the marginal decline where most of the infected people fall within the working population and children age group. This can be easily appreciated in a simple bar chart form as presented below:



Source: Generated by the author from table 2

Figure 4
Nigeria's HIV/AIDS Population

From the chart, although the number of people living with the disease in Nigeria reduced marginally as can be seen from 2003 figure to 2008, it has begun to pick up again as shown by 2009 bar.

2. THE LITERATURE

The term human capital has been viewed from different perspectives by various authors. Alani and Isola (2009) define it as human beings who possess skills, knowledge and attitudes which are utilised in the production process. In actual facts, the human capital components in man are the skills, knowledge, capabilities, attitudes and the experiences which are developed through education, health, on-the job training and other means.

Schultz (1961) has identified five means of human capital formation to include: i) Investment in health facilities and services; broadly conceived to include all expenditures that affect the life expectancy, strength and stamina, and the vigour and vitality of the people; ii) On-the-job training, including old-typed apprenticeships organized by firms; iii) Formally organized education at the elementary, secondary and higher levels; iv) Study programmes for adults that are organized by firms, including extension programmes notably in farm; and v) Migration of individuals and families to adjust to changing job opportunities. From the above, two major indices of human capital can be identified – education/training and health.

• Human Capital and Economic Growth

The works of Romer (1986) brings to the fore the strategic role played by human capital in economic

growth and development. Prior to this period, Becker (1964) had helped to shed some light on the importance of human capital in raising productivity in his human capital theory. Until this period, most growth theories such as the traditional neoclassical growth models championed by Robert Solow and Trevor Swan in the 1950s attribute output growth to the impacts of physical capital and population, neglecting human capital as an important input. These models popularly referred to as the exogenous growth models explain that technological progress which is assumed exogenous is important for growth and as the capital stock increases; growth of the economy slows down, but for the economy to maintain steady growth it must capitalize from incessant infusions of technological progress. This mechanism by the exogenous has been criticized which has given rise to the endogenous growth theory which provides vivid explanation for the role of human capital in economic growth. Many empirical studies have confirmed that human capital is very important for better economic performance.

• Health and Economic Growth

Relevant to this study is the health component of human capital formation. Health could be seen as physical and mental wellbeing of people which is measured using indicators such as life expectancy, adult mortality, child mortality rate, adult survival rate and so on. Health in recent times has been considered to be very crucial in terms of how it affects productivity as well as other means of human capital formation. According to Bloom and Canning (2008), "health is a direct source of human welfare and also an instrument for raising income levels." The level of productivity and growth in an economy will be greatly hampered by ill-health or prevalence of diseases in such an economy. This is because the likelihood exists that healthy individuals have the tendency to think rightly, be more efficient and obtain higher productivity (Grossman, 1972a; Bloom and Canning, 2000 and Aguayo-Rico, Guerra-turrubiates & DeOca-hernández, 2005). Sorkin (1977) had maintained that health actually imparts economic growth and development but for most developing countries there must be a deliberate efforts geared towards health programmes which would invariably increase the health status of their population thereby leading to increased man- hour for productivity gains.

Health as one of the fundamental components of human capital is very strategic for economic growth and development. The literature is fraught with empirical evidences of how health variables/indices have imparted economic outcomes in both developed and developing countries. Suhrcke, Arce, McKee & Rocco (2008) reported findings of historical studies on health and growth which revealed that much of today's economic wealth could be attributed to historical health gains. He pointed out facts given by Fogel (1994) which indicate that "about 50% of the economic growth experienced by the United Kingdom between 1780 and 1980 could be attributed to improved health and nutrition" while in a study by Arora (2001) on 10 industrialized countries found that improvements in health had increased the rate of economic growth by 30% to 40%.

In their study on "the long term impact of health on economic growth in Pakistan", Akram, Padda & Khan (2008), discovered that health variables influenced Per capita GDP positively while per capital GDP in turn impacts health variables positively in the long run, but the short run health variables have no significant impact on per capita GDP. In the same vein, Bloom, Canning & Sevilla (2004) investigated the effect of health on economic growth using production function approach with two important variables of work experience and health, and found that "good health has a positive, sizable, and statistically significant effect on aggregate output even when we control for experience of the workforce." Bakare and Olubokun (2011) research on the relationship that exists between health care expenditures and economic growth in Nigeria and found that a positive and significant relationship exists between both indices. Other studies which report positive relationship between health and economic growth include: Rivera and Currais (2003), Bloom et al. (2001), and Finlay (2007). These results notwithstanding, some forms of reservations are still being demonstrated by some authors as pointed out by Jack & Lewis (2009) that evidences from reviewed literature suggested that macroeconomic impact of health "remains ambiguous due both to difficulties in measuring health, and to the methodological challenges of identifying causal links" as against robust evidence on the micro linkages from health investments to productivity and income.

3. METHODOLOGY

The relationship between economic growth and human capital could be expressed using production function as employed in most studies on growth. Most growth studies such as those of Dauda (2010), Ayara (2003), Solow (1957), Klenow (2001), Mankiw et al (1992), and Asante, Asante, Asenso-Okyere & Kusi (2005)have all dwelled on the neoclassical theory/model using the production function approach.

For this study, the production function is specified as:

$$Y = f(K, L, H) \quad (1)$$

Where Y = Output, K = Physical Capital, L = Labour input and H = a vector of human capital variables.

From the production function, changes in output are not only due to changes in the quantity of physical capital and labour input alone but also of human capital variables. The health indices/variables employed in this study are:

Health Expenditure, Infant Mortality and Life expectancy.

3.1 Econometric/Empirical Model Specification

The model specified for this study based on the discussions above is given as:

$$RGDP = \alpha_0+\alpha_1 HLTX+\alpha_2 LEXP+\alpha_3 IMTL+\alpha_4 LBF+\alpha_5 GFC+ \alpha_6 EDUX + \mu \quad (2)$$

Where:
RGDP = Real Gross Domestic Product (proxy for economic growth);
HLTX = Total Health Expenditure (proxy for health capital);
LEXP = Life Expectancy (another proxy for health capital);
IMTL = Infant Mortality (also a proxy for health capital);
EDUX = Total Expenditure on Education (proxy for education capital);
LBF = Labour Force;
GFC = Gross Physical Capital Formation, (a proxy for physical capital); and
μ = Stochastic Disturbance Term.
α_0 = Intercept of the model
$\alpha_1 .... \alpha_5$ = The slopes of the regression or behavioural parameters.

A priori, it is expected that $\alpha_1, \alpha_2, \alpha_4 ... \alpha_6 > 0$ while $\alpha_3 < 0$. This implies that total public expenditures on health and education, life expectancy, labour force and gross physical capital formation should have positive relationship with the real gross domestic product. This means that an increase in any of the variables should increase or impart positively the level of the income in the economy, which is another way of saying that a rise in any of the variables should improve economic growth. For infant mortality, an indirect relationship exists between it and the gross domestic product, indicating that a fall in infant mortality should increase the level of GDP while a rise in infant mortality should reduce the GDP level in the country.

3.2 Data and Data Source

The data employed in this study were obtained from various issues of Annual Reports and Statement of Accounts; Statistical Bulletin published by the Central Bank of Nigeria, National Bureau of Statistics of Nigeria, World Development Indicators (WDI), International Financial Statistics (IFS), UNAIDS, WHO, UNData, US Census Bureau and US Global Health Policy.

4. RESULTS AND DISCUSSIONS

Table 3
Descriptive Statistics

	RGDP	EDUX	GFC	HLTX	IMTL	LBF	LEXP
Mean	243579.8	32443.86	271747.4	24306.24	110.2564	50127028	44.71386
Median	236729.6	1941.800	18414.00	452.6000	113.0000	46800000	44.76656
Maximum	672202.6	242731.0	1915349.	348042.9	129.0000	82000000	47.90859
Minimum	4219.000	6.200000	882.7000	11.90000	80.00000	30173908	40.36529
Std. Dev.	188041.7	58758.41	499056.0	61115.78	14.44175	15459535	1.778741
Skewness	0.538822	2.113227	2.020221	4.130956	-0.803531	0.515091	-0.551965
Kurtosis	2.636823	6.792775	5.825455	21.59947	2.515068	2.050932	3.378564
Jarque-Bera	2.101475	52.40309	39.50109	673.0741	4.578940	3.188254	2.213207
Probability	0.349680	0.000000	0.000000	0.000000	0.101320	0.203086	0.330680
Sum	9499610.	1265311.	10598148	947943.3	4300.000	1.95E+09	1743.841
Sum Sq. Dev.	1.34E+12	1.31E+11	9.46E+12	1.42E+11	7925.436	9.08E+15	120.2290
Observations	39	39	39	39	39	39	39

Source: Computed by the Author

From the table, real GDP averaged 243,579.8 million naira during the observed period and it varied between a minimum of 4219.00 million naira and a maximum of 672,202.6 million naira. Expenditure on education from 1970 to 2009 stood at an average of 32,443.86 million naira ranging between the lowest value of 6.200 million naira and the highest of 242,731.0 million naira. The same pattern could also be observed in the average value of gross fixed capital formation which remained at an average of 271,747.4 million naira, and ranged between a maximum value of 1,915,349 million naira and a minimum of 882.70 million naira from 1970 to 2009. Health expenditure averaged 24,306.24 million naira ranging from 11.90 million naira minimum to 34,8042.9 million naira maximum. Infant mortality had an average value of 110.2564 between a 40 year period with a minimum of 80.0 and maximum of 129.0 infant deaths per 1000 live births. The Nigerian Life expectancy had a mean of 44.71 years with the minimum year of 40.37 and maximum of 47.7 years within the period under consideration. The labour force averaged 50127028 people with a minimum of 30173908 and maximum of 82000000 people.

4.1 Unit Root Tests

It is always the case when dealing with time series variables to examine their properties in order to ensure robustness of the analysis and estimation. This is so

because most time series variables are not stationary and the outcome of classical econometric analysis is always based on the assumption that variables employed are stationary. If they are, their mean values and variances would not vary systematically over time and the result of our analysis will be valid. In order to avoid the situation of spurious regression there is the need to carry out unit root tests on the variables and determine the order of their integration. Phillips-Perron (PP) Tests for unit roots were conducted for all the variables used in the study. The results are shown in the table below.

Table 4
Phillips-Perron (PP) Test Results

Variables	PP Statistic Level	Critical Value (1%)	Critical Value (5%)	PP Statistic FD	Critical Value (1%)	Critical Value (5%)	Order of Integration
EDUX	2.700245	-3.610453	-2.938987	-5.996083	-3.615588	-2.941145	I(1)
GFC	-0.623548	-3.615588	-2.941145	-4.743795	-3.621023	-2.943427	I(1)
HLTX	7.972295	-3.610453	-2.938987	-3.713547	-3.615588	-2.941145	I(1)
IMTL	1.583144	-3.610453	-2.938987	-2.696932	-3.615588	-2.941145	I(1)
LBF	21.20585	-3.610453	-2.938987	-8.770697	-4.219126	-3.533083	I(1)
RGDP	1.838312	-3.610453	-2.938987	-5.418731	-3.615588	-2.941145	I(1)
LEXP	-3.413922	-3.610453	-2.938987	-0.425266	-3.615588	2.941145	I(0)

Source: Computed and Extracted by the Author from Computer output

From the results, except life expectancy which was stationary at level, all other variables became stationary at their first difference. In addition, the test results revealed that the series were all integrated series of order I(1) except life expectancy which was of order I(0). The result necessitated the cointegration test since virtually all the variables became stationary at their first difference and are of the same order. To conduct this test, there is the need for the residual of the long run regression analysis to be stationary before the cointegration test could be justified.

4.2 Johansen Co-integration Test and Results

The literature affirms that if the series are integrated of the same order, then there is the need to test whether they are cointegrated. The results of the analysis revealed six cointegrating equations as can be seen from the Trace statistic and the Maximum Eigenvalue in the tables below. This implies that there exists long run relationship between real gdp and the other explanatory variables in the model, and so, the explanatory variables can confidently predict the behaviour of the dependent variable (rgdp) in the specified model.

Table 5
Result of the Phillips-Perron Unit Root Test for Residual

	PP At Level				PP at First Difference			
Variable	PP Test Statistic	Critical Value (1%)	Critical Value (5%)	Critical Value (10%)	PP Test Statistic	Critical Value (1%)	Critical Value (5%)	Critical Value (10%)
Residual	-3.383510	-2.627238	-1.949856	-1.611469	-9.634879	-2.628961	-1.950117	-1.611339

Source: Computed and Extracted by the Author from Computer output

Table 6
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.981740	372.4811	125.6154	0.0000
At most 1 *	0.901329	224.3681	95.75366	0.0000
At most 2 *	0.754162	138.6775	69.81889	0.0000
At most 3 *	0.610518	86.76347	47.85613	0.0000
At most 4 *	0.550548	51.87476	29.79707	0.0000
At most 5 *	0.432823	22.28492	15.49471	0.0041
At most 6	0.034599	1.302835	3.841466	0.2537

Trace test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Computed and Extracted by the Author from Computer output

Table 7
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.981740	148.1130	46.23142	0.0000
At most 1 *	0.901329	85.69068	40.07757	0.0000
At most 2 *	0.754162	51.91399	33.87687	0.0001
At most 3 *	0.610518	34.88871	27.58434	0.0048
At most 4 *	0.550548	29.58984	21.13162	0.0026
At most 5 *	0.432823	20.98209	14.26460	0.0038
At most 6	0.034599	1.302835	3.841466	0.2537

Max-eigenvalue test indicates 6 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Computed and Extracted by the Author from Computer output

The presence of cointegrating equations further proves that there is the need for a more dynamic estimation to determine how the independent variables could impart the dependent variable and to determine the short run behaviour of the model. To this end the error correction modelling approach was adopted. This helps to remove any discrepancy that may happen in the short run since it may be possible for short run equilibrium not to occur in spite of the presence of a long-run equilibrium.

Table 8
The Over-Parameterized Dynamic Error Correction

Dependent Variable: D(RGDP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDUX)	-0.833653	0.866119	-0.962515	0.4068
D(EDUX(-1)	-0.906960	1.091185	-0.831170	0.4668
D(EDUX(-2))	0.000428	0.867322	0.000493	0.9996
D(EDUX(-3))	0.614224	0.998520	0.615134	0.5820
D(EDUX(-4))	-0.204169	2.661831	-0.076703	0.9437
D(GFC)	-0.081922	0.206477	-0.396764	0.7181
D(GFC(-1))	-0.162887	0.158773	-1.025908	0.3804
D(GFC(-2))	-0.147218	0.365075	-0.403254	0.7138
D(GFC(-3))	0.202713	0.325955	0.621903	0.5781
D(GFC(-4))	0.050242	0.327564	0.153382	0.8878
D(HLTX)	0.472920	0.481021	0.983160	0.3980
D(HLTX(-1))	-0.076642	0.492096	-0.155745	0.8861
D(HLTX(-2))	-0.628865	0.508980	-1.235542	0.3046
D(HLTX(-3))	-0.797580	0.637816	-1.250487	0.2998
D(HLTX(-4))	-0.027807	0.526697	-0.052794	0.9612
D(IMTL)	2912.283	4952.823	0.588005	0.5979
D(IMTL(-1))	-11326.35	6423.523	-1.763261	0.1761
D(IMTL(-2))	-9439.614	5812.981	-1.623885	0.2029
D(IMTL(-3))	-20459.89	6952.342	-2.942878	0.0604
D(IMTL(-4))	-5805.469	8191.891	-0.708685	0.5296
D(LBF)	-0.003960	0.008686	-0.455826	0.6795
D(LBF(-1))	0.009305	0.009660	0.963196	0.4065
D(LBF(-2))	0.021685	0.004344	4.991752	0.0155
D(LBF(-3))	0.024219	0.006655	3.639132	0.0358
D(LBF(-4))	-0.071226	0.011283	-6.312835	0.0080
D(LEXP)	1646877.	651758.4	2.526822	0.0857
D(LEXP(-1))	-3517979.	1555980.	-2.260940	0.1088
D(LEXP(-2))	2577782.	1842379.	1.399160	0.2562
D(LEXP(-3))	-883584.1	1299422.	-0.679982	0.5453
D(LEXP(-4))	200185.1	406663.8	0.492262	0.6563
ECM(-1)	-0.488713	0.197340	-2.476504	0.0895
R-squared	0.994826	Mean dependent var		19302.44
Adjusted R-squared	0.943086	S.D. dependent var		33321.39
S.E. of regression	7949.364	Akaike info criterion		20.19535
Sum squared resid	1.90E+08	Schwarz criterion		21.58703
Log likelihood	-312.3210	Durbin-Watson stat		3.662055

Source: Computed and Extracted by the Author from Computer output

Table 8 shows the results of the overparameterized model which was used to handle all misspecification problems associated with the model. Having done this, variables which were insignificant considering the high level of their probabilities were eliminated. This action was repeated until parsimony was achieved.

Table 9
The Parsimonious Error Correction Model

Dependent Variable: D(RGDP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDUX)	-1.055175	0.281372	-3.750106	0.0028
D(EDUX(-1))	-1.182958	0.362933	-3.259441	0.0068
D(EDUX(-3))	0.801942	0.333856	2.402061	0.0334
D(GFC)	-0.083879	0.049544	-1.693027	0.1162
D(GFC(-1))	-0.160620	0.038976	-4.121015	0.0014

To be continued

Continued

Dependent Variable: D(RGDP)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFC(-2))	-0.128291	0.027996	-4.582435	0.0006
D(GFC(-3))	0.282004	0.076804	3.671757	0.0032
D(HLTX)	0.604714	0.131741	4.590159	0.0006
D(HLTX(-2))	-0.583659	0.214244	-2.724274	0.0185
D(HLTX(-3))	-0.507927	0.242824	-2.091752	0.0584
D(IMTL(-1))	-10233.06	3930.091	-2.603772	0.0231
D(IMTL(-2))	-9125.593	2708.595	-3.369125	0.0056
D(IMTL(-3))	-20361.31	2812.193	-7.240369	0.0000
D(LBF(-1))	0.014609	0.003191	4.578154	0.0006
D(LBF(-2))	0.021452	0.002759	7.774890	0.0000
D(LBF(-3))	0.020819	0.003251	6.403494	0.0000
D(LBF(-4))	-0.075463	0.004683	-16.11272	0.0000
D(LEXP)	1289917.	318842.7	4.045623	0.0016
D(LEXP(-1))	-2622108.	735362.0	-3.565737	0.0039
D(LEXP(-2))	1597779.	647521.1	2.467532	0.0296
D(LEXP(-3))	-248367.6	222389.3	-1.116814	0.2859
ECM(-1)	-0.397371	0.057501	-6.910699	0.0000
R-squared	0.989711	Mean dependent var		19302.44
Adjusted R-squared	0.971705	S.D. dependent var		33321.39
S.E. of regression	5604.987	Akaike info criterion		20.35336
Sum squared resid	3.77E+08	Schwarz criterion		21.34101
Log likelihood	-324.0072	Durbin-Watson stat		3.150034

Source: Computed and Extracted by the Author from Computer output

Table 9 shows the parsimonious model which gives the final results of the analyses carried out to determine whether or not health as a fundamental component of human capital formation matters for the growth of the Nigerian economy. From the result, health expenditure at first difference is positive and statistically significant. The result is in line with the a priori expectation and supported by the finding of Bakare and Olubokun (2011). Meanwhile, the differences of second and third lags show statistical significance but the coefficients are negative, which are at variance with a priori expectation of positive sign. The negative relationship could be due to the possible fact that greater percentage of expenditure on health goes for gratification since Nigeria is still bedevilled with a high level of corruption and part of the money earmarked for health expenditure could be diverted for personal enrichment and not for health related issues. Infant mortality is significant and with negative coefficient. This agrees with theoretical a priori of negative relationship and in accordance with the finding of Akram et al. (2008). An increase in infant mortality rate reduces the level of economic growth since such infants would not live to the age of adulthood to contribute to productivity within the economy and the expenditure incurred both at the public and private levels on infants-prone diseases are on the increase, which act to reduce the income available for investment that brings about growth. Life expectancy is positive and statistically significant at the first difference and difference of the second lag. This implies that increase in life expectancy raises the level of gdp within the Nigerian economy but a look at the differences of first lag and third lag shows negative coefficient. Within the Nigerian economy, average life expectancy has remained very low over the years, hovering between 43 and 47 for more than 50 years. The implication of this is that the level of real gdp in Nigeria has not contributed meaningfully to improvement in life expectancy and also life expectancy seems not to have impacted on positively the growth of the economy of Nigeria. The fact here could be due to the huge income realized from the oil sector that employs a very minute percentage of the work force of the country. Education variable, which is the public expenditure on education is statistically significant and positive at the difference of third lag. Labour force variable shows positive and significant relationship. The findings of Dauda (2010) support this result. Nigeria's economy is actually labour-intensive based, this might have accounted for this nature of result. Gross fixed capital is also positive and significant considering the difference of the third lag. These relationships of both variables are in compliance with the a priori expectation. The first difference and difference of first lag of education variable are significant but the coefficients are negative which are against the theoretical expectation of positive relationship. The ECM variable is negative, less than one in absolute term and statistically significant. The coefficient is given as 0.397371 approximately 40%. This means that the speed of adjustment or convergence to equilibrium is 40%. The model demonstrates a good fit. This is evident from the coefficient of determination (R2) of 99% and the adjusted R2 of 97% showing that the explanatory power of the model is strong with the independent variables

explaining 97 percent of the movement in the dependent variable. The Durbin-Watson statistic of 3.15 falls within the acceptable range of no autocorrelation, which implies that there is no autocorrelation in the model.

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

The study has tried to address the issue of whether health as a component of human capital formation matters for the growth of the Nigerian economy. Time series properties of the data employed in the study were tested namely: the unit root test and cointegration analysis and error correction model of analysis. The results show that a positive and significant long-run relationship exists between real GDPand life expectancy but the coefficients of the first lag and third lag shows negative coefficient. Health expenditure is positive and statistically significant. Although, the second and third lags of health expenditure were negative but they are statistically significant. Infant mortality is significant and has negative coefficient. Life expectancy is positive and statistically significant at the first difference and difference of the second lag.

The conclusion from this analysis is that, the long-run relationships and the statistical significance of health indices/variables show that health as a component of human capital formation matters for the growth of the Nigerian economy but the alternation of the signs of their coefficients is an indication that the government still has to show more commitment to the issue of health in the economy. For instance, it is necessary for the government to devote more money to fighting the menace of communicable diseases in the country in order to improve the health status of the population, reduce infant mortality and improve life expectancy. Furthermore, Nigerian government should in addition to increasing expenditure on health put in place mechanism to monitor how effectively such fund is been utilized for the purpose for which it is meant. Attempt should be made to reduce corruption to the barest minimum if the country hopes to achieve any meaningful progress in heath improvement as well as growth of the economy. All efforts should also be geared towards combating the menace of HIV/AIDS and malaria which are the major contributors to high level of morbidity and mortality in the country which continue to reduce the life expectancy in the country. Nigeria's economic performance could be greatly enhanced if the percentage of the nation's annual budget devoted to health is increased and more commitment is demonstrated by the three tiers of government towards programmes and activities that would enhance and improve the health of the citizens.

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