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Abstract. In this paper, I establish the relationship between human capital investment and economic development in Nigeria using a micro-data. Previous studies on Nigeria have exploited the macro data and findings are inconclusive. These studies proxied educational quality by enrolment in learning institutions. Instead, I utilized educational attainment which is a better measure of educational output. The results reveal that all the human capital indicators adopted in the study with the exception of primary school attainment positively drive economic development in Nigeria. The disconnection between economic development and primary education may be traced to the low skill acquired at this level. I observe that the positive link between secondary, tertiary, and economic development is weaker when compared to macro-studies which used enrolment rate rather than educational attainment. This suggests that these studies may have over-estimated the effect of human capital investment, particularly education on economic development in Nigeria. This finding therefore could redirect government policies towards focusing more on educational attainment as the outcome of educational input.

Key words: Economic development, education, health, human capital, Nigeria
JEL classification: 012

1 Introduction

In the last two decades, there has been increasing awareness in developing countries about the relevance of investments in health and education in economic development. Experiences of the developed countries have demonstrated that the importance of this duo in stimulating economic growth and development cannot be underplayed. For a substantial number of the developing countries, literacy rate is growing rapidly and budgetary allocation to health and education has increased significantly. Similarly, international donors, agencies and government of the advanced countries have not ceased supporting education and health projects in developing nations. In Nigeria, these positive developments have only been marginal. Health expenditure per capita in 2009 was estimated at US$69, below the sub-Saharan Africa average (SSA) of US$76 (Africa Development Indicators, 2011). Education disbursements are also low as real expenditure earmarked to the education sector has grown at an average of below 7 per cent since 2004. Total education expenditure as a proportion of annual fiscal budget is well below 10 per cent. This falls short of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) requirement of 25 per cent. Consequently, human capital development indicators have not performed well. Under-five mortality per 1,000 and maternal mortality per 100,000 live births are 138 and 840 respectively, compared to sub-Saharan Africa average of 130 and 646. Adult literacy rate is at 60.8 per cent, while Ghana, Kenya and Zimbabwe boast of 66.6, 87, and 91.9 per cent respectively. The literature is replete with studies which have researched the link between human capital and economic development in Nigeria. The debate is on-going as there is no consensus on the role of human capital in raising the living standards of the people. The differing findings have been mostly attributed to data sources and the choice of methodology. Further, no study in the Nigerian literature of which I am aware have estimated the effects of human capital on economic development, using a micro-data.
This study therefore approached this topic from a micro-perspective using the Nigerian Living Standard Survey of 2004 and exploiting its robust data.

The second gap filled by this study is in its choice of the education indicator. In the macro-studies, primary, secondary and tertiary education enrolment rates rather than completion rate is used to measure the quality of education. In this study, I adopted the latter. This is because enrolment rate is an educational input, while completion rate appropriately measures educational output. In these respects, my work enormously deviates from previous studies in Nigeria.

The effort to investigate the significance of human capital formation on economic development in Nigeria is structured into five parts. The next section provides some stylized facts about human capital and development in Nigeria. Section three gives a review of relevant literature, while the analytical framework and methodology used in analyzing the data is presented in section four. Section five discusses the empirical results. Section six closes out the study with conclusion and policy recommendations.

2 Stylized facts on human capital and development in Nigeria

The health and education sector in Nigeria in the last three decades have been mired in challenges, ranging from under-funding, corruption and poor service delivery amongst others as shown by statistics. Despite the vast role of investments in human capital in economic growth and development of a nation, budget allocation to these sectors has not improved significantly. Figure 1 shows budget disbursement to education and health sector as a proportion of total budget since 1984.1

Figure 1 shows an unstable trend in the allocation to the education and health sectors as a percentage of the total budget (recurrent and capital) between 1984 and 2011. It is worth mentioning that allocation to these sectors as a ratio of total budget only averaged 6.8 and 3.6 per cent correspondingly during this period.

In fact, the budgetary disbursement to the education sector between 1984 and 2011, as shown above did not exceed 10 per cent, hence below the UNESCO requirement, which suggests that a minimum of 25 per cent of budgetary allocation should be set aside to the education sector. Similarly, the share of allocation to the health sector in the total budget did not exceed 7%.

Not surprisingly, the performance of these sectors has been below average. A close observation at figure 2 shows that the contribution of the education sector to real

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1 Some years are missing from the graph due to data unavailability.
economic growth declined from its peak in 1984 through 2004, and regained an upward slow trend through 2011. The health sector’s contribution to economic growth however declined between 1981 and 2011, shedding about 16%.

Similarly, health and education outcomes as measured by the Human Development Indicator (HDI) suggest a slow growth in Nigeria’s economic development. Between 2005 and 2012, economic development in Nigeria improved marginally by 9.9% as shown by the United Nations Human Development Indicators. Figure 3 shows an upward trend in Nigeria’s HDI from 2005 to 2012. Between 2005 and 2006, one would notice that the country’s economic development surpassed that of sub-Saharan Africa average. However, from 2007 to 2012, the trend was reversed.

Figure 3: Human Development Indicator for Nigeria and sub Saharan Africa
Source: UNDP, country profile

2 Literature review

Micro evidence on the human capital and economic development nexus is scanty in Nigeria. One major reason for this is the lack of a regular survey (particularly labour survey) data on which such analysis can be carried out. However, at the macro level quite a number of studies have researched this topic. Nevertheless, empirical results are inconclusive and often depend on the data used, choice of variable proxies and specification method. In this review, I have given preference to studies on Nigeria and developing countries. The rationale for this is in two folds. Since the quality and composition of human capital varies across countries, the outcome of empirical results will largely depend on country-specific factors. Similarly, this is essential in order to allow for a comparison of results obtained in this study with earlier findings in Nigeria.

(Qureshi and Mohyuddin, 2006) probed into the relationship between health status, diseases and gross domestic product (GDP) in eighteen developing countries. The identified diseases were Tuberculosis, Diarrhea, Malaria, and Hepatitis, while under-five mortality rate and life expectancy at birth were proxies for health status. Using Ordinary Least Squares technique, they observed that only Hepatitis was significant and negatively affects gross domestic product. However, the growth rate of GDP was significantly influenced by Diarrhea, Hepatitis, and Malaria. They argued that since Diarrhea and Tuberculosis mostly affects the young and the aged respectively, and less prevalent among the working-age, they are less likely to have an impact on the GDP.

Conducting a study on sub-Saharan Africa (SSA), (Bloom et al, 2005) investigated the impact of higher education at the tertiary level on economic development using panel regression. The data set spanned 1960-2000 and the explanatory variables include life expectancy, capital stock, tertiary enrolment and output data. Their results show that capital stock and labour are significant contributors to aggregate output. However, the contribution of health as measured by life expectancy was marginal but significant. Ultimately they found that increasing tertiary education seemed to raise the rate of technological convergence toward SSA’s production possibility frontier (PPF). This was made possible because according to them SSA’s current production level was about 23% below its PPF.

(Mahmood et al, 2012) examined whether human capital promotes economic development in Pakistan using time-series data from 1971-2009. The human capital variables identified were, high school enrolment (HSE), other educational institutional enrolment (OSE), and expenditure on education (EXED). Using bound
testing procedure within the framework of the Autoregressive Distributed Lag (ARDL), the model was estimated using Ordinary Least Squares method (OLS). HSE and OSE have positive and significant impact on economic development in both the short-run and long-run, while education expenditure did not drive economic development.

In attempting to show the long run relationship between education and growth in Nigeria, (Babatunde and Adefabi, 2005) applied the Johansen co-integration technique and the vector error correction on data between 1970 and 2003. The results of the co-integrating technique established a long run relationship between enrolments in primary and tertiary level as well as the average years of schooling and output per worker. It also found that high quality labour force and education expenditure significantly influence growth both as a factor in the production function and through total factor productivity.

(Vinod and Kaushik, 2007) investigated the role of human capital on economic growth in eighteen developing countries (Nigeria inclusive) between the period 1982-2001, using time series and panel regressions. The Ordinary Least Squares method was used to estimate the data. Findings from the time-series regression revealed that the elasticity of gross domestic product (GDP) with respect to human capital (adult literacy) was greater than 1, for 13 of the 18 countries sampled. For Nigeria, one percentage increase in literacy level will increase GDP by 73%. The coefficient of the labour force variable for Nigeria was negative at -0.1296, implying that a one per cent increase in the size of the labour force will reduce GDP by about 13%. This opposes (Babatunde and Adefabi’s, 2005) findings which supported that growth of labour force positively influences economic growth in Nigeria. The panel regression further revealed that the human capital variable was positively significant. For most of the countries, a 1 per cent increase in literacy increased growth by 120 to 470 per cent.

(Ndiyo, 2007) however reported a negative and statistically significant relationship between education and productivity in Nigeria. The time series data set was more robust covering about thirty years, 1970-2000. Real education expenditure was used to proxy educational capital. Other human capital variables adopted are number of university graduates and labour force. Exploiting the Vector Autoregressive method (VAR), he found that educational capital depresses economic growth in Nigeria. Also using a non-linear production form, the empirical evidence did not support a positive correlation among number of graduates, real education expenditure, and economic growth in Nigeria. He attributed the result to impeding factors inherent in the educational system such as over-emphasis on paper qualifications as against delivery, redundancy of some skills and workers etc.

(Lawanson, 2009) also using a macro data investigated the role of investment in health and education on economic development in Nigeria between 1983 and 2007. The study adopted Error Correction Mechanism (ECM) and found a positive relationship between human capital and economic growth in Nigeria, although the link was weak. Only tertiary enrolment and education expenditure positively spurred economic growth. Health expenditure, primary and secondary enrolment had no relationship with economic growth. The major flaws of the study are the use of GDP as a proxy for economic development and the short observation (24 years). In a similar study, (Dauda, 2010) further examined the link between human capital and economic development in Nigeria using the Error Correction Mechanism (ECM). Real GDP was used as a proxy for economic development. The independent variables identified were gross capital formation (GCF), labour force, primary, secondary and tertiary school enrolment rates.

The study showed that a one per cent increase in the labour force, tertiary and secondary school enrolment, and GCF would increase real GDP by 13, 48, 104, and 76 per cent correspondingly. In a more recent study, (Adawo, 2011) investigated the importance of education to
economic growth in Nigeria. Human capital proxies such as health expenditure, primary, secondary, tertiary enrolment, and labour force were considered. Interestingly, the author acknowledged the role of the quality of education in driving economic growth, but stuck with enrolment rates which do not appropriately measure educational output. Using the Ordinary Least Squares (OLS) method, the author found that labour force, primary, and tertiary school enrolments were not significant in influencing economic growth in Nigeria. Secondary enrolment was however significant, but negatively affects gross domestic product. Health expenditure was positive and significant. A one per cent increase in expenditure on health would increase GDP by 3.1%.

The foregoing review shows mixed findings in the connection between human capital and economic development/growth in Nigeria. Almost all the studies reviewed measured the impact of education using enrolment rates. One major challenge with using enrolment as a measure of human capital in a developing country like Nigeria is that few students complete their education after enrolment due to the high drop-out rate. Between 1986 and 1992, drop-out rate in primary schools in Nigeria was estimated at 43.2% (World Bank, 2007). Students often leave school to help out on the farm or work as domestic workers to supplement family income due to high poverty incidence. Primary school completion rate in Nigeria was 74.36% in 2010 (World Bank, 2012). A plausible reason for the relatively high completion rate in primary schools is the Universal Basic Education scheme (UBE) which offers free education to students in the primary school through junior secondary school level. Apart from financial constraints, other impediments to education completion include cultural bias against female education prominent in the Northern part of the country, seemingly lucrative businesses which require little education, interference of school curriculum with family businesses, particularly farming, and long distance of school to students’ residences.

Consequently, using enrolment rate in lieu of completion rate could over-state the relevance of educational inputs in the development process. I am aware that there exists no study in Nigeria which has attempted to establish the relationship between human capital and development with a micro-data. This is the void filled by this study.

3. Methodology
3.1 The theoretical framework

To analyse the relationship between human capital and economic development, this study draws largely from the Lucas human capital model. This is the conventional framework tracing the link between these variables in many economies. The model takes the form

\[ Y = AK^\alpha (uhL)^{1-\alpha} \]  

(1)

Where \( Y \) is output, \( K \) is physical capital, \( L \) represents labour, \( u \) is the proportion of total labour time spent working, and \( h \) is the stock of human capital. Where \( 0 < \alpha < 1 \), \( \alpha \) represents the elasticity of physical capital, labour and human capital. \( A \), denotes technology.

The above production function can be expressed in per capita terms by writing in intensive form as

\[ y = Ak^{\alpha} (uh)^{1-\alpha} \]  

(2)

Equation 2 (per capita output) implies constant returns to scale in physical capital \( k \) and human capital stock \( uh \).

Capital accumulation proceeds through the usual differential equation

\[ k = y - c - (\epsilon + \delta)k \]  

(3)

In specifying how knowledge is accumulated, agents learn when they study, thus we would relate human capital accumulation to time spent not working

\[ h = \phi h(1-u) \]  

\[ \dot{h} = \phi(1-u) \]  

(4)

Equation 4 implies constant returns to scale in human capital accumulation, since growth rate
of human capital stock is proportional to study time. This assumption is crucial. It is the driving force behind sustained growth in the model. To complete the model and thus relate it specifically to my study, I expressed equation 2 in terms of growth rate of output per capita. Taking the logarithm and differentiating with respect to time yields

$$\frac{y}{A} = \frac{\alpha k}{k} + \frac{(1 - \alpha) k}{h}$$

Equation 5 expresses growth rate of real output per capita as a function of growth of human capital stock, physical capital and technology improvement.

3.2 Data and estimation methodology

The data used for the study is the Nigeria Living Standard Survey of 2004. The sample design is a two-stage stratified type. The 1st stage involved a cluster of housing units, known as Enumeration Areas (EA), while the 2nd stage involved the Housing Units (HU). It is an extensive survey covering the six geo-political zones in the country, thus allowing for the evaluation of the living standards in the country. Information on demographic characteristics, health, education, income, expenditure, and employment of individuals and households are provided. 120 EAs and 600 HUs were selected in each state for the 12-month survey period. Interviewers made 7 visits at interval of 4 days within a month to the selected households in order to ensure continuous record of the dynamics of household behaviour.

The Ordinary Least Squares (OLS) method is adopted in estimating the link between economic development and human capital growth in Nigeria. Since the paper examined the topic from a micro-perspective and made use of a household survey data, household per capita expenditure was used to proxy welfare or living standard, which is a component of economic development. The logic behind this is that an improvement in welfare constitutes economic development at the macro-level.

The variables identified in the model are; educational completion (primary, secondary, tertiary), per capita health expenditure, per capita education expenditure, literacy level, per capita income and age-group. Household size, male-headed household, and sector (urban or rural) are introduced as control variables. The choice of variables is premised on lead from previous empirical studies, both Nigeria and other-country studies. It is expected that educational attainment, education and health spending will vary positively with per capita expenditure. Family size is believed to be inversely related to per capita expenditure, while I expect the working age group 36-51 to have a larger positive impact on per capita expenditure.

The economic relationship among these variables is specified in the multiple regression model shown below

$$PC_{exp} = \alpha_1 + \alpha_2 hsize + \alpha_3 pceduexp + \alpha_4 pchtexp + \alpha_5 pcinc + \alpha_6 D_2 + \alpha_7 D_3 + \alpha_8 D_4 + \alpha_9 D_5 + \alpha_{10} D_6 + \alpha_{11} D_7 + \alpha_{12} D_8 + \alpha_{13} D_9 + \epsilon_t$$

(6)

where

- $PC_{exp}$ = per capita expenditure
- $Hsize$ = household size
- $Pceduexp$ = per capita education expenditure
- $Pchtexp$ = per capita health expenditure
- $Pcinc$ = per capita income
- $D_2$ = 1 if literate
- $D_3$ = 0 if non-literate
- $D_4$ = 1 if male-headed household
- $D_5$ = 0 if female-headed household
- $D_6$ = 1 if urban
- $D_7$ = 0 if rural
- $D_8$ = 1 if primary completion
- $D_9$ = 0 otherwise
- $D_{10}$ = 1 if secondary completion
- $D_{11}$ = 0 otherwise
- $D_{12}$ = 1 if age 20-35
- $D_{13}$ = 0 otherwise
- $D_{14}$ = 1 if age 36-51
- $D_{15}$ = 0 otherwise
- $D_{16}$ = 1 if age 52-67
- $D_{17}$ = 0 otherwise
- $\epsilon_t$ = disturbance term
3.3 Empirical Results and Analysis

**Table 1: Ordinary Least Squares (OLS) estimates of Human Capital Investment and Economic Development in Nigeria**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household size</td>
<td>-1360.80***</td>
<td>330.69</td>
<td>-4.11</td>
</tr>
<tr>
<td>Per capita education exp</td>
<td>1.4613***</td>
<td>0.1088</td>
<td>13.43</td>
</tr>
<tr>
<td>Per capita health exp</td>
<td>1.0153***</td>
<td>0.0310</td>
<td>32.67</td>
</tr>
<tr>
<td>Per capita income</td>
<td>0.1752***</td>
<td>0.0311</td>
<td>5.62</td>
</tr>
<tr>
<td>Literacy (dummy)</td>
<td>4185.93*</td>
<td>2152.33</td>
<td>1.94</td>
</tr>
<tr>
<td>Male-headed (dummy)</td>
<td>-709.14</td>
<td>2474.21</td>
<td>-0.29</td>
</tr>
<tr>
<td>Urban (dummy)</td>
<td>992.57</td>
<td>1735.36</td>
<td>0.57</td>
</tr>
<tr>
<td>Age 20-35 (dummy)</td>
<td>-3608.43</td>
<td>4575.48</td>
<td>-0.79</td>
</tr>
<tr>
<td>Age 36-51 (dummy)</td>
<td>-3362.79</td>
<td>4281.24</td>
<td>-0.79</td>
</tr>
<tr>
<td>Age 52-67 (dummy)</td>
<td>-2093.83</td>
<td>4424.57</td>
<td>-0.47</td>
</tr>
<tr>
<td>Primary (dummy)</td>
<td>-3600.27</td>
<td>3568.12</td>
<td>-1.01</td>
</tr>
<tr>
<td>Secondary (dummy)</td>
<td>-6692.04**</td>
<td>2395.69</td>
<td>-2.79</td>
</tr>
<tr>
<td>Constant</td>
<td>36279.43</td>
<td>5993.82</td>
<td>6.05</td>
</tr>
</tbody>
</table>

$R^2=0.3893$

Adj. $R^2=0.3864$

Sample Size= 2579

$F(12,2566) = 136.30$

Prob.>F=0.0000

*, **, *** coefficients are significant at 10%, 5%, and 1% levels respectively. The dependent variable is per capita expenditure.

The results presented in table 1 indicate an R-square of 0.3893, implying that about 39 per cent of variations in the household per capita expenditure are explained by the independent variables. The low R-square is not surprising since the data used is a household survey, which is a representation of the population. The premium between the adjusted R-square and R-square is small, estimated at about 0.0029. This suggests that the model did not include any unimportant explanatory variable in the context of the Nigerian economy. The overall fit of the regression is significant as indicated by the Prob.>F=0.0000. Per capita income, literacy, per capita health expenditure, household size, per capita education expenditure, and secondary education are significant at varying levels. Household size is significant at 10 per cent and has a negative coefficient of 1360.80, which indicates that an increase in the size of the household by one person, holding all other variables constant will result in a decline in per capita expenditure by N1,360.80k (Nigerian currency). This conforms to apriori expectation, since a larger households tends to deplete household resources. Per capita spending on education is significant at 10 per cent and also has a positive coefficient suggestive of a positive correlation between education expenditure and economic development. A one unit increase in educational spending per person will increase per capita expenditure in the household marginally by N1.46k. This finding reinforces (Babatunde and Adefabi, 2005) and more recently (Lawanson, 2009) which found that government spending on education positively influences economic growth in Nigeria. It however contrasts (Ndiyo, 2007) which found a negative and significant relationship between education expenditure and productivity in Nigeria. Health expenditure per person has a positive and significant coefficient of 1.0153, indicating that a rise in the spending on health by one unit will translate to about N1.01k increase in the per capita expenditure and consequently
economic development. (Lawanson, 2009) in her study found no correlation between health expenditure and economic growth in Nigeria. My findings however gave some credence to the results of (Adawo, 2011) which revealed that a one per cent rise in health expenditure will increase gross domestic product in Nigeria by about 3.1 per cent. The conclusion which can be drawn from my study about the role of educational and health spending in driving economic development is that educational spending seem to have a larger multiplier effect. This revelation supports figure 2 above, which depicts that the contribution of the education sector to the real gross domestic product exceeded that of the health sector between 1981 and 2011.

As expected, a positive relationship exists between per capita income and expenditure, which is also significant at 1 per cent level. Household per capita expenditure will increase by N0.17k following a rise in income per person by N1.00. This finding is in harmony with the absolute income hypothesis which suggests that the relationship between income and expenditure is not one-for-one. That is, expenditure will rise by less than the increase in income. Literacy level as measured by the percentage of those who can read and write English-Language is significant at 10 per cent. The literates therefore have a higher chance of increasing their per capita expenditure by N4,185 over the illiterates. (Vinod and Kaushik, 2007) also supported the evidence of a strong and positive link between literacy and gross domestic product in Nigeria.

Gender, location (i.e. rural or urban), and age-group are not significant and thus do not drive per capita expenditure of households in Nigeria. Attainment of education at the primary level is also insignificant in influencing the living standards of households in Nigeria. This result supports earlier studies by (Lawanson, 2009) and (Adawo, 2011) on the non-existent relationship between primary school enrolment and economic development in Nigeria. Nevertheless, (Babatunde and Adefabi, 2005) found a positive and significant relationship between primary enrolment and economic development in Nigeria. (Dauda, 2010) also did not find evidence to support a positive link between primary school enrolment and real GDP in Nigeria. A plausible explanation for my results is that in Nigeria, education at the primary level is insufficient to provide the needed skills to make one employable and receive a moderate or high income. Further, since unemployment rate is very high in the country estimated at 23.9% in 2011 (National Bureau of Statistics) the few available jobs in the formal sector are rationed among those with higher qualifications, thus crowding-out those with primary education.

The dummy for secondary education completion is significant at 5% and the coefficient negative (6692.04). Since the reference category is tertiary education, this indicates that households with members completing secondary school education will have a short-fall of N6,692.04k in their per capita expenditure compared to those with tertiary education. This is consistent with apriori expectations and could be attributed to higher skills acquired at these levels of education which tends to impact positively on productivity levels. (Dauda, 2010) established a positive link between secondary school enrolment and economic growth in Nigeria. (Babatunde and Adefabi, 2005), (Lawanson, 2009) and (Dauda, 2010) also supported a positive and significant relationship between secondary enrolment and productivity in Nigeria. (Ndiyo, 2007) and (Adawo, 2010) on the other hand refuted this positive nexus.

4 Conclusion

This paper examined the impact of human capital on economic development in Nigeria, using a household survey data. Previous studies on this topic in Nigeria have exploited macro-data and findings are inconclusive. This study filled a gap in the Nigerian literature by adopting a micro-data in investigating this nexus, and also using educational attainment level, rather than enrolment rate as one of the
indicators of human capital. The empirical results showed that among the indicators of human capital, only primary education attainment was insignificant. Literacy, per capita education and health expenditure, secondary education attainment in relation to tertiary had a positive feed-back mechanism with economic development. The findings point out the relatively smaller effect of secondary and tertiary education when compared to results from studies which used educational enrolment. This suggests that educational completion rather than enrolment is a better measure of the output or quality of education.

Increased efforts should be geared towards retaining students in school after enrolment. Also, legislations to compel parents to ensure that their wards go beyond the primary school education should be signed into law. This should be complemented with a curriculum that incorporates technical skills at the secondary school level that will enable students to make generate moderate income for themselves even if they discontinue their education after the secondary level. This would also enable them make meaningful contributions to productivity. Allocations to health and education sectors should be revised upward, for them to have the necessary impact on development. Further, misappropriation of funds at the three-tier government levels should be checked to ensure that the funds disbursed to these key sectors are translated into improvement in living standards.

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