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A Disaggregated Analysis of Wealth Status and Educational Attainment in Nigeria Using the Multinomial Logit Approach

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Abstract: For most studies that have been carried out, a country's level of income and aggregate wealth go a long way in shaping the overall welfare of citizens therein. This study seeks to investigate the relationship between wealth status and educational attainment, as a manifestation of income inequality, especially when the wealth status is disaggregated. With data obtained from the National Demographic and Health Survey (DHS) 2013 and the adoption of the multinomial logit model, this study captured exogenous variables such as wealth index, the core variable; household sex preference, a dummy variable that takes the value of 1 if a household prefers a male child and 0 otherwise; and place, another control variable. This study finds that there is a very significant relationship between wealth status and educational attainment, especially for the individual categories of wealth index, hence, educational inequality hinders the quest to achieve higher educational levels for individuals from low wealth families. This study therefore recommends that the government should engender state-based subsidized education cost programs that will be targeted at poor households, as well as intensify efforts in solidifying the overall educational framework in the country, especially in the rural areas bereft of facilities.

Keywords: wealth status; educational attainment; government; multinomial logit

JEL Classification: O15; D31

1. Introduction

Achieving human capital development through education is absolutely imperative to the determination of income. It could potentially help in the reduction of economic disparities and unbridled inequalities across the different regions of Nigeria (Amzat 2014). In a study carried out by Fuchs et al. (2010) on developing countries, education plays a vital role in determining the level of child mortality, especially the education of the mother, who sometimes functions as the head of the household. Education has also been seen as a very efficient policy weapon that can be used to ameliorate economic inequality among marginalized genders and groups in underdeveloped or developing countries such as Nigeria (Omoeva et al. 2016).

Unfortunately, Olibie et al. (2013) and Amzat (2014) opine that poverty is one factor that has hindered many bright minds in Nigeria from having access to sound education, notwithstanding family background (Ribar 1993). They further reiterated that this absolute poverty replete in Nigerian homes is promoted by the unstable government and the leadership which is in a state of comatose. Even Ferguson et al. (2007) added that since educational outcomes are heavily influenced by family

incomes, children who come from low-income households commence schooling later than their peers who come from wealthier homes. Thus, the duration, timing and incidence of poverty have been proven to affect a child's educational attainment. It is even more worrisome considering the fact that the major indicators of a region's income levels and differentials in Nigeria include not only the varying degrees of educational attainment, but also the varying degrees of educational inequality (Umar 2016). While these studies go on to show how income and wealth affect educational attainment, many other researchers have also seen the dwindling educational system as a culprit (Onwuameze 2013).

Following on from this, it cannot in any way be said that there are no wealthy people in Nigeria, or that Nigeria is simply a country of poverty tales. However, it goes to show a possibility that the wealth is not evenly distributed. Fagbamigbe et al. (2015) opined that empirical studies that show how wealth is shared among the various societal wealth statuses in Nigeria are very few. This even made it very difficult for an informed policy decision to be made in the past. A brief historical gaze reveals that even in the U.S.A., there have been serious disagreements regarding what could best be adjudged as the optimal level of wealth inequality, especially as it affects taxation and general welfare (Norton and Ariely 2011). Davies et al. (2005) further added that the distribution of wealth in the world is actually more unequal than the distribution of income. It is against this backdrop that this study seeks to analyze wealth status and educational attainment in Nigeria, with the former disaggregated.

2. Literature Review

Many empirical studies have been carried out, both in Nigeria and elsewhere, on household wealth status and educational attainment. Omoeva et al. (2016), focused on characterizing the differentials in economic opportunities available to gender, identity (religious or ethnic) and gender-by-identity groups as they relate to the differences in educational attainment. They found that by closing up identity group and gender-based education disparities, a substantial increase is seen in the total number of salaried workers as well as in the total wage bill. This empirically shows that an inequality in educational attainment has been slowing the economy down for years. Bedasso et al. (2018), in their study of the effect of family migration on educational attainment in Nigeria, employed the World Bank's migration and remittance household survey. They found that migration increases the chances of finishing secondary school as well as having some tertiary education. In a seminal paper written by Burda et al. (2001), the inequality in wealth distribution is caused by the eruption of the corruption phenomenon, where a large part of the overall wealth is siphoned by one person.

In analyzing the wealth status and sex differentials of households, and how they affect the source of drinking water in Nigeria, Morakinyo et al. (2015) found that the wealth status of a particular Nigerian household has a severe influence on the relationship between the sex of the household head and an improved source of drinking water. Lamidi (2015) studied the demographics of Nigerian households with threatened livelihoods, with data from the Nigerian General Household Survey (GHS). Adopting a multinomial logistic regression technique, she found that the level of association between the predictors of household socioeconomic status (i.e., employment, household wealth, and education) and the experiences of limited water access and household food insecurity is largely weak. This outcome is already a deviation from many other empirical studies discussed above, especially those highlighting the immense effects of household wealth on the capacity to climb the society's educational ladder. A similar study by Ashagidigbi et al. (2018), aimed at examining the links and impacts of maternal education and household wealth on the incidence of child death in Nigeria, adopted the logit, probit and principal component analysis models. With data from the 2013 Nigeria Demographic and Health Survey (NDHS), they found that maternal education has a very profound and positive effect on household wealth. They also found that households with low levels of maternal education and wealth index are more likely to incur a higher child mortality rate in rural Nigeria, compared to those with higher levels. Umar et al. (2014) also investigated the extent of inequality in educational attainment in Nigeria by regions using the Theil Index and decomposition analysis. They found that a higher educational inequality is experienced in Northern Nigeria than in Southern

Nigeria. They also revealed that the main source of educational inequality in Nigeria is the inequality within the individual regions and not that between regions, and that there is an inverse relationship between educational attainment and inequality. Onwuameze (2013) focused, primarily, on assessing how socioeconomic status forecasts achievement in reading and numeracy in Nigerian school children within the age bracket of 5 to 16 years. Employing cross-sectional data from the 2010 Nigeria Education Data Survey (NEDS), the study found that family wealth is the most critical variable predicting achievement in reading and numeracy, followed by mother's education and then region.

3. Data

The 2013 Nigeria Demographic and Health Survey (NDHS), follows those implemented in 1990, 1999, 2003, and 2008, hence, is the fifth DHS in Nigeria. A nationally representative sample of 38,522 households from 904 primary sampling units (PSUs) was selected. In the 2013 DHS, a household is defined as people living together who are either related or not related, who eat from the same pot and unanimously recognize one person as the household head (National Population Commission (NPC) Nigeria and ICF International (2014)). With about 176,963 persons captured in the survey, each household, on average, has about 4.6 persons. This sample of individuals captured in the DHS study is presented against the total population of Nigeria in 2013, which is 171,829,303 (WDI 2016).

This research work therefore employs a population weight of 1:970 persons. Also, this study employs the one-stage sampling technique, which is the household. The variables adopted from the DHS 2013 to cover for all the objectives of this study include number of household members, educational attainment of any household members, sex of household head, age of household head, sons at home, daughters at home, sons elsewhere, daughters elsewhere, age of respondents at first birth, type of earnings for work, sons who have died, daughters who have died, type of place of residence and wealth index. Wealth index is a composite measure of a household's cumulative living standard. It is calculated using easy-to-collect data on a household's ownership of selected assets such as television, air conditioner and refrigerator, materials used for housing construction, and types of water access and sanitation facilities. After gathering this data, the principal component analysis (PCA) is employed in constructing wealth index. This study also covers all parts of Nigeria, with samples drawn from all the regions of Nigeria, in line with the DHS 2013 final report.

4. Methodology

This study, as was mentioned above, seeks to investigate the level and nature of the relationship between the wealth status of Nigerian households and educational attainment in Nigeria. To do this, we will employ the multinomial logit model. The data here, from Nigeria's Demographic and Health Survey (DHS) 2013, involves 38,522 households who have different levels of educational attainment ranging from no education, incomplete primary education, complete primary education, incomplete secondary education, complete secondary education to higher education, which are coded as 0, 1, 2, 3, 4, and 5. To present the multinomial logit model in general, we have:

$$Y_{ij} = 1, \text{ if the household } i \text{ chooses alternative } j \text{ (} j = 0, 1, 2, 3, 4 \text{ and } 5 \text{ in this study)}$$

$$Y_{ij} = 0 \text{ if otherwise}$$

Further, let

$$\pi_{ij} = Pr(Y_{ij} = 1)$$

where Pr stands for probability.

Therefore, $\pi_{i0}, \pi_{i1}, \pi_{i2}, \pi_{i3}, \pi_{i4}$ and π_{i5} represent the probabilities that household i chooses alternatives 0, 1, 2, 3, 4 and 5, respectively. Because these are the only alternatives a household faces, we will have

$$\pi_{i0} + \pi_{i1} + \pi_{i2} + \pi_{i3} + \pi_{i4} + \pi_{i5} = 1 \quad (1)$$

This results from the fact that the addition of the probabilities of mutually exclusive and exhaustive events must be 1. In this study, therefore, once we are able to determine all five probabilities, the sixth one is automatically determined. For the objectives this model seeks to capture, wealth index is the major factor examined here to ascertain its relationship with education attainment. Note also that since this study is a disaggregated analysis, the effects of the different categories of the wealth index on educational attainment are individually analyzed. Hence, the factors in this model which serve as independent variables are:

WINDX = Wealth Index for households, with 1 for the poorest households and 5 for the richest households.

PLACE = Household place of residence, with 1 for households in rural areas and 2 for households in urban areas.

SEX PREFERENCE = 1 if a son is preferred and 0 otherwise.

X_1 will be used to represent the intercept.

For the multinomial logit model which we want to estimate, we will choose one category of household educational attainment as the base or comparison category and set its coefficient values to zero. Here, therefore, we select the zero (0) category (no education) as our base and set $\alpha_0 = 0$ and $\beta_0 = 0$. We therefore obtain the following estimates of the probabilities for the six choices.

$$\pi_{i0} = \frac{1}{1 + e^{\alpha_1 + \beta_1 X_i} + e^{\alpha_2 + \beta_2 X_i} + e^{\alpha_3 + \beta_3 X_i} + e^{\alpha_4 + \beta_4 X_i} + e^{\alpha_5 + \beta_5 X_i} + e^{\alpha_6 + \beta_6 X_i}} \quad (2)$$

$$\pi_{i1} = \frac{e^{\alpha_1 + \beta_1 X_i}}{1 + e^{\alpha_1 + \beta_1 X_i} + e^{\alpha_2 + \beta_2 X_i} + e^{\alpha_3 + \beta_3 X_i} + e^{\alpha_4 + \beta_4 X_i} + e^{\alpha_5 + \beta_5 X_i} + e^{\alpha_6 + \beta_6 X_i}} \quad (3)$$

$$\pi_{i2} = \frac{e^{\alpha_2 + \beta_2 X_i}}{1 + e^{\alpha_1 + \beta_1 X_i} + e^{\alpha_2 + \beta_2 X_i} + e^{\alpha_3 + \beta_3 X_i} + e^{\alpha_4 + \beta_4 X_i} + e^{\alpha_5 + \beta_5 X_i} + e^{\alpha_6 + \beta_6 X_i}} \quad (4)$$

$$\pi_{i3} = \frac{e^{\alpha_3 + \beta_3 X_i}}{1 + e^{\alpha_1 + \beta_1 X_i} + e^{\alpha_2 + \beta_2 X_i} + e^{\alpha_3 + \beta_3 X_i} + e^{\alpha_4 + \beta_4 X_i} + e^{\alpha_5 + \beta_5 X_i} + e^{\alpha_6 + \beta_6 X_i}} \quad (5)$$

$$\pi_{i4} = \frac{e^{\alpha_4 + \beta_4 X_i}}{1 + e^{\alpha_1 + \beta_1 X_i} + e^{\alpha_2 + \beta_2 X_i} + e^{\alpha_3 + \beta_3 X_i} + e^{\alpha_4 + \beta_4 X_i} + e^{\alpha_5 + \beta_5 X_i} + e^{\alpha_6 + \beta_6 X_i}} \quad (6)$$

$$\pi_{i5} = \frac{e^{\alpha_5 + \beta_5 X_i}}{1 + e^{\alpha_1 + \beta_1 X_i} + e^{\alpha_2 + \beta_2 X_i} + e^{\alpha_3 + \beta_3 X_i} + e^{\alpha_4 + \beta_4 X_i} + e^{\alpha_5 + \beta_5 X_i} + e^{\alpha_6 + \beta_6 X_i}} \quad (7)$$

Note that in Equations (2) through (7), we use X to denote the regressors which have been defined above. Also, although the same regressors appear in each response probability expression, their coefficients will not necessarily assume the same values. To now convert Equations (2) through (7), which are nonlinear in nature, to linear functions, which define the multinomial logit itself, we have

$$\ln\left(\frac{\pi_{i1}}{\pi_{i0}}\right) = \alpha_1 + \beta_1 X_i \quad (8)$$

$$\ln\left(\frac{\pi_{i2}}{\pi_{i0}}\right) = \alpha_2 + \beta_2 X_i \quad (9)$$

$$\ln\left(\frac{\pi_{i3}}{\pi_{i0}}\right) = \alpha_3 + \beta_3 X_i \quad (10)$$

$$\ln\left(\frac{\pi_{i4}}{\pi_{i0}}\right) = \alpha_4 + \beta_4 X_i \quad (11)$$

$$\ln\left(\frac{\pi_{i5}}{\pi_{i0}}\right) = \alpha_5 + \beta_5 X_i \quad (12)$$

$$\pi_{i0} = 1 - \pi_{i1} - \pi_{i2} - \pi_{i3} - \pi_{i4} - \pi_{i5} \quad (13)$$

Equations (8) through (12) depict the logs of the odds ratio. This ratio tells us by how much alternative j is preferred over alternative l .

5. Analysis

We recall that the objective of this study is to identify the nature of the relationship between the wealth status of Nigerian households and educational attainment in Nigeria. We also present a multinomial logit model here to address this. To effectively do this, we disaggregate the variable “wealth index” so as to identify how each wealth status relates with educational attainment in Nigeria. The result output is presented in Table 1 below.

Table 1. Multinomial logit model of disaggregated wealth status and educational attainment in Nigeria.

hhea	Linearized			
	Coef	Std. Err.	t	P > (t)
No education				
1 Inc. Pri.				
Windx				
2	0.9060258	0.0257349	35.21	0.000
3	1.670569	0.026606	62.79	0.000
4	1.728724	0.0326823	52.89	0.000
5	1.753896	0.0499815	35.09	0.000
Place	−0.1348651	0.0225773	−5.97	0.000
Sex_pref	0.0198475	0.0173398	1.14	0.252
constant	−2.760233	0.0504456	−54.72	0.000
2 Com. Pri.				
Windx				
2	1.35771	0.0231758	58.58	0.000
3	2.422641	0.0232068	104.39	0.000
4	3.123336	0.0255327	122.33	0.000
5	3.726623	0.0345575	107.84	0.000
Place	0.1402687	0.0163073	8.60	0.000
Sex_pref	−0.0122704	0.0129047	−0.95	0.342
constant	−3.173692	0.0391836	−81.00	0.000
3 Inc. Sec.				
Windx				
2	1.846202	0.0439819	41.98	0.000
3	3.15534	0.0425817	74.10	0.000
4	4.223138	0.043338	97.46	0.000
5	5.254581	0.0489261	107.40	0.000
Place	0.2219905	0.01191624	11.58	0.000
Sex_pref	0.0237823	0.0163913	1.45	0.147
constant	−4.815693	0.0554707	−86.82	0.000
4 Com. Sec.				
Windx				
2	2.466528	0.0791368	31.17	0.000
3	4.097061	0.0768224	53.33	0.000
4	5.61592	0.0768199	73.11	0.000
5	7.333492	0.0795418	92.20	0.000
Place	0.1486079	0.0189527	7.84	0.000
Sex_pref	−0.0578405	0.0165355	3.50	0.000
constant	−5.97155	0.084793	−70.43	0.000

Table 1. Cont.

Linearized				
hhea	Coef	Std. Err.	t	P > (t)
No education				
5 Higher				
Windx				
2	1.565468	0.1893265	8.27	0.000
3	4.158055	0.1708576	24.34	0.000
4	6.066585	0.1698254	35.72	0.000
5	8.571925	0.1713053	50.04	0.000
Place	0.076471	0.0265014	2.89	0.000
Sex_pref	0.0384243	0.02245	1.71	0.087
constant	−7.428679	0.1796318	−41.36	0.000

Source: Researcher's Estimation using Stata 12.

From Table 1 above, each of the panels 1 to 5 presents the variable “Windx”, i.e., wealth index, in terms of its categories. Only the first category is omitted because it serves as a reference point and, hence, is a category whose effect is known without empirical research. The other categories of wealth index presented as coded are 2 = poorer households, 3 = middle income households, 4 = richer households and 5 = the richest households. Note that the omitted category is 1 = poorest households.

Panel 1 shows that all households that fall within the wealth status of poorer (coded 2) to richest (coded 5) are more likely to have incomplete primary education as their maximum level of education in comparison to not having any education at all. All the categories also have highly statistically significant coefficients here. In panel 2 also, households that fall within any of the wealth statuses shown there are more likely to complete primary education in comparison to not having any education at all. All the categories also have statistically significant coefficients. In panel 3, the households in the various societal wealth strata are more likely to have incomplete secondary education as the maximum for any member of the household, in comparison to not having any education at all. Like other panels, the coefficients of the wealth strata are statistically significant. Still, in panels 4 and 5, the same could be said of the households within all the wealth statuses. They are more likely to complete their secondary education and attain higher education, respectively, in comparison to not having any education at all. The coefficients of the different wealth statuses are also statistically significant for the two panels.

This result is therefore summarized thus: regardless of the wealth status occupied by Nigerian households, poor, rich or middle class, they all strive hard to attain at least a minimum level of education. This is evident in the large number of individuals who seek admission into Nigeria's institutions of learning on a yearly basis. Thus, a very strong relationship exists between the wealth status of Nigerian households and the maximum educational attainment of any household member in Nigeria, especially as educational attainment relates with the various categories of wealth index.

It is also very pertinent to point out here that the difference between the coefficients of wealth status is much greater for the higher education levels (parts 4 and 5 of Table 1) than for the primary education coefficients (parts 1 and 2 of Table 1). This implies that there is more inequality of educational attainment in Nigeria in the higher levels of education that can be associated with wealth differences.

From panel 1 of Table 1, we also see from the coefficient of place, i.e., the dummy variable which takes the value of 1 for households in rural areas and 2 for households in urban areas, that households in urban areas are less likely to have an incomplete primary education as the maximum level of education of any household member, in comparison to households in rural areas. This is in line with the a priori expectation, given that urban areas in Nigeria have more educational facilities from nursery to tertiary. In line with this argument, panels 2 to 5 reveal that for higher education levels, i.e., from complete primary education to university education, households in urban areas are more likely to have them as their maximum in comparison to those in rural areas.

A very important point to note here also is that for the logistic regression model analyzed in this study, a joint significance exists between the regressors, as shown by the probability of the F-values.

6. Policy Implications of the Study

The findings of this study are in line with those of [Filmer and Pritchett \(2015\)](#). They explained that one of the most salient implications could be two-fold. One is that most households strive to at least attain a minimal level of education. The implication of this is that in the long-run, the country will run short of efficient human capital if there are no efficient institutional frameworks to absorb them, as many will look for opportunities abroad, leading to brain drain, which could bring about a downward spiral in economic growth.

Also, since the effect of household wealth status on educational attainment is so intense, some poor households never get to enroll in school at all. This further implies a larger population that could resort to crime and other social vices since they are not academically engaged. This will not impact well upon the economy. [Filmer and Pritchett \(2015\)](#) also revealed that for some developing countries such as Nigeria, the wealth gap in educational attainment is as high as 9 or 10 years. Economically, this implies that there is still a lot of work to be done regarding Nigeria's inequality status.

7. Summary and Conclusions

In this study, we carried out an economic analysis in order to ascertain the relationship between the wealth status of Nigerian households and educational attainment. The major objective was, therefore, to disaggregate the wealth index and observe how the different societal income and wealth strata affect educational achievement. After a thorough investigation of the economic realities of Nigerian households, made possible with data from the National Demographic and Health Survey (DHS) 2013, it was found that regardless of the wealth status occupied by Nigerian households, poor, rich or middle class, they all strive hard to attain at least a minimum level of education.

This is evident in the large number of individuals who seek admission into Nigeria's institutions of learning on a yearly basis. Thus, a very strong relationship exists between the wealth status of Nigerian households and educational attainment in Nigeria, as reflected by the logistic regression results for each of the wealth index categories, the variable showing the wealth statuses. To achieve this, the multinomial logit model was employed. The study in general, therefore, is a cross-sectional analysis which hopes to contribute to solving the problems in the Nigerian context that could be attributed to societal inequality or the wealth-education gap.

8. Policy Recommendation

A study such as this has so many policy implications which, if carefully identified and treated appropriately, could contribute to economic prosperity. To this effect, the following policy recommendations emanating from the findings of this study are in order.

1. Since the study found that regardless of the wealth status occupied by Nigerian households, poor, rich or middle class, they all strive hard to attain at least a minimum level of education, it is quite glaring that those at the lower wealth strata suffer more to receive the same education enjoyed by those at the higher wealth strata. This then calls for the principle of equity and not equality in dealing with the various households in Nigeria. As a recommendation, the government should engender state-based subsidized education cost programs that will target the poor households more, and not just leave it in the hands of rich individuals, who will help in defeating the aim.
2. Finally, the study found that since education is important to virtually all households in contemporary times, regardless of the level of wealth or poverty, more people seek to go through the conventional educational system, just to be adjudged as people who have "educational attainment", there is a strong recommendation that the government should start viewing education from a wider perspective. This is because technical education, if standardized in

Nigeria, will reduce the quest for conventional educational, and households have higher chances of using the “technical educational attainment” that they have obtained to elevate themselves to a better societal wealth status, which is a function of both temporary and permanent income.

3. The Nigerian government should put more effort into improving educational access for people who are in the lower wealth status to be able to achieve high educational levels. While this is not so relevant in basic education, results show that low wealth families are particularly damaged by educational inequality when it comes to higher educational levels.
4. The rural areas in Nigeria should not be left out in the educational programs and projects of Nigeria. This is the only way to breach the alarming gap between the educational access of those in rural areas and that of those in the urban areas.

If these policy recommendations are seen by the government at any level as anything to go by, it will greatly benefit Nigeria in general and Nigerian households specifically.

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