Assessing Impacts of Indicators of Child Wealth Index in Africa: A Study of Four Regions in Sub-Saharan Africa

Choja Oduaran
https://orcid.org/0000-0001-8815-3930
North-West University
choja.oduaran@nwu.ac.za

Christopher Godwin Udomboso
https://orcid.org/0000-0002-0338-8261
University of Ibadan
cg.udomboso@gmail.com

Abstract

Recently, the well-being of children in developing countries has attracted much attention. However, literature is sparse on the effects of family well-being on the child. This study assesses indicators of the Child Wealth Index in Africa in four out of five regions of the continent of Africa, based on countries with the highest and lowest Gross Domestic Product (GDP). The regions include Central, Eastern, Southern, and Western Africa. Data were obtained from the latest Demographic and Health Survey of each country, where each respondent family was categorised into either "poor," "middle" or "rich." Multinomial logistic regression was utilised to study the effects of the indicators on child well-being. Results show that the majority of countries have more children in the poor category, especially in rural areas. Furthermore, there are negative correlations between Child Wealth Index and residence, and positive correlations between Child Wealth Index and housing conditions with access to electricity. Indicators of the Child Wealth Index include highest education, place of residence, housing conditions, toilet facility, and access to electricity and appliances. It is inferred that many countries in Africa have a low Wealth Index despite their high GDP. Therefore, African governments need to improve the living standards of their people.

Keywords: Child Wealth Index; child well-being; Africa; Demographic and Health Survey; Gross Domestic Product (GDP); multinomial logistic regression

Introduction

Determining the economic status of a country or region by using household income as an indicator has gained popularity among economists. Hence, it is difficult to arrive at an accurate measurement of income for some reasons. People do not always disclose their real income to interviewers; household members may not have access to all elements of income; or income may not be similar all year round. The implication of this inaccurate disclosure of income is the inability to report welfare precisely in different social contexts. For instance, societies where daily living centres around flocks and agricultural products, may find it difficult to report income generated in quantitative terms. This has given rise to the consideration of an alternative approach in the measurement of household income. This is known as a consumption expenditure approach, which allows for easy collection of estimates that are standardised across numerous countries around the globe (World Bank 2003; 2016). Besides, in agricultural economies, consumption is believed to be more consistent in measuring poverty per time than actual income (Deaton and Zaidi 2002; Hjelm, Mathiassen, and Wadhwa 2016). These measurement indicators are often accessible in household survey indicators.

Household socio-demographic indicators have been made available through the efforts of the World Bank as well as other national and international agencies, who have conducted household surveys on socio-economic indicators for most Intergovernmental Authority on Development (IGAD) countries. In addition, governments of certain countries like Uganda, do conduct regular household surveys across regions of the country, with the same objectives as those of the World Bank. The main elements of these surveys are data regarding demographics, education, employment, expenditure, health, as well as income. It also includes household characteristics and their assets such as agricultural produce and livestock. These surveys only supply a basis for fair comparisons of welfare at a particular time within a country and are not adequate for cross-country comparisons. Such data make comparisons across the regions impossible.

A further attempt to handle the issue of standardisation of household survey data emerged in the Demographic and Health Survey (DHS). The DHS programme came into existence through the efforts of the United States Agency for International Development (USAID) in 1984. It was intended to follow up on an initial project, the World Fertility Survey and the Contraceptive Prevalence Survey. The DHS features were incorporated into the 1993 USAID's multi-project MEASURE programme as MEASURE DHS+, which led to the expansion of the content on maternal and child health. The Wealth Index, which is a component of DHS surveys, has been used as a proxy for the measurement of income or expenditure. This proxy consists of some indicators that can potentially explain households' economic status (Rutstein and Johnson 2004). These indicators include possession of assets like a television, radio, mobile telephone or refrigerator. They also include variables about the facilities in the

place of residence like type of flooring, water supply, as well as number of occupants per room. The DHS Wealth Index remains a specific measure of the economic status of the survey, i.e. the results are only applicable for a particular country and for a specific survey period in that country, with one exception, Peru. The DHS Wealth Index is helpful to examine differentials in economic status in countries, but it must be pointed out that the Wealth Index is constructed within each country at the time of the survey as a relative index for the exploration of problems of economic equity and poverty. An average value of zero and a regular variance is present in each Wealth Index. Specific scores cannot, therefore, be directly compared across countries or over time. For example, in an extremely poor country, a household may be included in the highest quintile of wealth, but this same household may not necessarily be well-off in absolute terms (Rutstein and Staveteig 2014).

The Wealth Index (WI) represents individual national surveys, therefore it is not accurate for direct cross-country comparisons since the indicators vary from country to country. Thus, the index is a relative measure of wealth that is peculiar to a given survey (Chakraborty et al. 2016; Rutstein and Johnson 2004). In a study by the Food and Agriculture Organisation (FAO 2015), the WI was reported to correlate significantly with other welfare estimates in countries within the Intergovernmental Authority on Development (IGAD) region. Consequently, the WI has been used to access information that is relevant to measuring households in both the urban and rural areas, so that a comparison can be made between them across various indicators. The procedure for conducting such analysis has been supplied by Rutstein (2008). However, this may create some difficulties due to the level of poverty in a sub-Saharan African country like Nigeria.

It has been documented that poverty and increasing waves of crime in Nigeria—especially in the Niger Delta Region—are responsible for the obvious gap between the rich and poor (Achinulo 2017). This often provokes the youth in those regions to resort to protest because wealth is not evenly distributed. Within the context of Nigeria, politics is viewed as a quick means of making money. Besides, globalisation has also affected the Nigerian economy remarkably (Maduka, Madichie, and Eze 2017), which has contributed to social and economic challenges facing the country. However, education has been identified as a powerful tool to tackle poverty. It is even more potent when the age of commencement of schooling is regarded as important. The implication of this is that such an individual will be able to join the world of work earlier and begin to make money to support the household income (Morrissey, Hutchison, and Winsler 2013). An important determinant of child schooling is parents' education (Pufall et al. 2016). In sub-Saharan African countries, studies have revealed that gender gaps do exist in child schooling, with a higher enrolment ratio among males (World Bank 1989). Statistics on schooling and enrolment also vary across rural and urban areas (Khandker, Khalily, and Zahed 1995), with urban children outperforming their counterparts from the rural areas.

There are controversies in the limitation of the adoption of household income as an indicator for measuring child wealth. The limitation is often traced to measurement errors that are associated with the use of current household annual income. However, this error can be corrected through the adoption of household expenditure as a proxy for income (Gibson and Kim 2013). The present research focuses on children because they are identified as a special category of youth. On this basis, the materials and methods used in this research are discussed in the next section.

Materials and Methods

Data

The present research presented data from the most recent Demographic and Health Survey (DHS) for the countries included in the analysis. Four regions were chosen for this analysis. They are the areas that engage in the DHS exercises. This criterion, therefore, excludes the North African region. Two countries are chosen for each region included in this report. The selection criteria are objective, involving the countries with the highest and lowest GDP in each region, using the 2015 list of African countries by GDP (nominal).

The following table shows the list of countries with the highest and lowest GDP (nominal) by region.

Table 1: Countries with Highest and Lowest GDP (nominal) by region (2015)

Region	Highest GDP	Lowest GDP
Central Africa	Angola	Congo-Brazzaville
East Africa	Kenya	Comoros
Southern Africa	Zambia	Malawi
West Africa	Nigeria	Gambia

For the Central African countries, the data for both Angola and Congo-Brazzaville are from the 2011 DHS, while for the East African countries, the data for Kenya are from the 2014 DHS, and the data for Comoros are from the 2012 DHS. On the other hand, in the case of Southern African countries, the data from Zambia are from the 2013 DHS, while data from Malawi are from the 2014 DHS. For the countries in West Africa, the data for both Nigeria and Gambia are from the 2013 DHS.

The variables considered in the datasets include Child Wealth Index measured as 1 = poor, 2 = middle, 3 = rich; highest education measured as 0 = No education, 1 = Primary, 2 = Secondary, 3 = Higher; time to get to water source; housing measured as 1 = low, 2 = medium, 3 = high, 4 = other; residence measured as 1 = urban, 2 = rural; source of drinking water measured as 1 = protected water source, 2 = unprotected water source, 3 = delivery water source, 4 = packaged water source, 5 = other; toilet measured as 1 = modern, 2 = pit, 3 = open, 4 = none, 5 = other; electricity measured as 0 = no, 1 = yes,

7 = not a de jure resident; appliances measured as 0 = no, 1 = yes, 7 = not a de jure resident; two-leg mobility measured as 0 = no, 1 = yes, 7 = not a de jure resident; four-leg mobility measured as 0 = no, 1 = yes, 7 = not a de jure resident.

Statistical Approach: Multinomial Logistic Regression

Multinomial logistic regression was used in this study for the multivariate approach. This form of regression generalises logistic regression into multiclass problems. In this case, the observations may result in more than two possible discrete outcomes (Greene 2012). Multinomial logistic regression has been found to be a model that is capable of predicting probabilities of different possible outcomes of a categorically (or nominally) distributed dependent variable, given a set of independent variables whose outcome may be real-valued, binary-valued, categorical-valued, and so on.

Multinomial logistic regression uses a linear predictor function $f(k, i)$ to predict the probability that observation i has outcome k, of the following form:

$$f(k, i) = \beta_{0,k} + \beta_{1,k} x_{1,i} + \beta_{2,k} x_{2,1} + \cdots + \beta_{M,k} x_{M,i}$$

(i)

which we can also write as:

$$y_i = \beta_{0,k} + \beta_{1,k} x_{1,i} + \beta_{2,k} x_{2,1} + \cdots + \beta_{M,k} x_{M,i}$$

(ii)

Where $f(k, i)$ is a probability function associated with the outcomes, which we write as y_i, representing the vector of outcome variables (Child Wealth Index), $x_{M,i}$ is the matrix of predictor, or response variables (highest education, time to get to water source, housing, residence, source of drinking water, toilet, electricity, appliances, two-leg mobility, four-leg mobility), $\beta_{m.k}$ is a regression coefficient associated. The variables, "highest education"; "time to get to water source"; and "housing" are considered continuous in the analyses.

Equation (ii) can be written more clearly:

$$f(k, i) = \beta_k . \mathrm{X}_i$$

(iii)

where β_k is the set of regression coefficients associated with outcome k, and X_i is the set of explanatory variables associated with observation i.

We introduce separate sets of regression coefficients, one for each possible outcome, so that we further write the above in a logistic regression form as:

$$\ln \frac{Pr(Y_i = 1)}{Pr(Y_i = K)} = \beta_1 \mathrm{X}_i$$

$$\ln \frac{Pr(Y_i = 2)}{Pr(Y_i = K)} = \beta_2 X_i$$

$$\vdots$$

$$\ln \frac{Pr(Y_i = K - 1)}{Pr(Y_i = K)} = \beta_{K-1} X_i$$

On exponentiation of both sides, and solving the probabilities, we obtain:

$$Pr(Y_i = 1) = Pr(Y_i = K)e^{\beta_1 . X_i}$$

$$Pr(Y_i = 2) = Pr(Y_i = K)e^{\beta_2 . X_i}$$

$$\vdots$$

$$Pr(Y_i = K - 1) = Pr(Y_i = K)e^{\beta_{K-1} . X_i}$$

These probabilities can be found as:

$$Pr(Y_i = 1) = \frac{e^{\beta_1 . X_i}}{1 + \sum_{k=1}^{K-1} e^{\beta_k . X_i}}$$

$$Pr(Y_i = 2) = \frac{e^{\beta_2 . X_i}}{1 + \sum_{k=1}^{K-1} e^{\beta_k . X_i}}$$

$$Pr(Y_i = K - 1) = \frac{e^{\beta_{K-1} . X_i}}{1 + \sum_{k=1}^{K-1} e^{\beta_k . X_i}}$$

and sum to one. Hence, the multinomial logistic regression is compactly written as:

$$Pr(Y_i = K) = \frac{1}{1 + \sum_{k=1}^{K-1} e^{\beta_k . X_i}}$$

$$(iv)$$

with the terms as explained earlier.

Results and Discussions

The analyses were conducted for each country at the various levels of univariate, bivariate, and multivariate. Table 1 presents the results of the univariate analyses, showing the percentage distribution of the study characteristics of indicators of Child Wealth Index, while the results of the bivariate analyses in Table 2 show the correlations of the indicators of Child Wealth Index, and for the multivariate analyses, Table 3 shows the odd ratios of indicators of Child Wealth Index.

Table 2: Percentage Distribution of Study Characteristics of Indicators of Child Wealth Index in Africa[§]

	Angola	Comoros	Congo-Braz	Gambia	Kenya	Malawi	Nigeria	Zambia
Wealth Index								
Poor	28.9	47.8	72.6	50.2	55.0	38.9	45.9	47.7
Middle	18.5	19.2	11.1	21.0	16.7	19.4	19.9	22.8
Rich	52.6	33.0	16.3	28.8	28.3	41.7	34.1	29.6
Residence								
Urban	35.6	34.1	25.8	34.3	32.6	30.7	32.9	37.1
Rural	64.4	65.9	74.2	65.7	67.4	69.3	67.1	62.9
Highest education								
No education	33.2	44.7	10.1	63.6	21.9	12.5	46.9	11.2
Primary	55.9	24.1	40.2	14.1	52.7	66.6	20.4	55.6
Secondary	9.5	24.5	48.1	19.9	19.1	18.9	26.6	29.6
Higher	1.4	6.8	1.5	2.3	6.3	2.0	6.1	3.5
Source of drinking water								
Protected water source	46.0	74.0	47.1	87.0	55.5	82.9	53.8	56.5
Unprotected water source	40.4	19.6	44.8	11.1	38.2	15.6	39.8	40.2
Delivery water source	11.4	2.3	-	-	1.8	-	1.9	0.2
Packaged water source	0.2	0.1	0.5	0.0	0.9	-	3.6	0.2
Other	2.0	3.9	7.6	1.9	3.6	1.5	0.9	2.9
Time to get to water source								
1 to 5 minutes	-	6.0	5.0	17.0	7.0	17.0	16.0	15.0
6 to 20 minutes	-	10.0	23.0	33.0	26.0	28.0	35.0	37.0
21 to 60 minutes	-	14.0	38.0	18.0	30.0	25.0	24.0	23.0
61 minutes and above	-	3.0	7.0	1.0	8.0	2.0	4.0	3.0
On premises	-	62.1	20.7	28.9	25.7	24.5	19.8	18.7
Not a de jure resident	-	0.5	5.0	1.3	2.3	1.5	0.9	2.4
Don't know	-	4.1	0.6	0.4	0.4	2.6	0.6	1.7

	Angola	Comoros	Congo-Braz	Gambia	Kenya	Malawi	Nigeria	Zambia
Toilet								
Modern	20.1	12.0	3.0	15.6	7.9	2.8	14.2	8.6
Pit	29.1	81.1	73.1	80.2	65.0	85.1	51.9	72.3
Open	4.8	5.9	2.4	-	1.3	0.2	2.8	0.2
None	43.2	0.6	16.5	2.9	23.3	9.8	30.3	16.5
Other	2.8	0.5	5.0	1.4	2.5	2.1	0.9	2.4
Electricity								
No	66.6	36.0	75.1	69.7	77.9	85.7	52.8	79.6
Yes	31.4	63.5	20.0	29.0	19.8	12.8	46.4	17.9
Not a de jure resident	1.9	0.5	4.9	1.3	2.3	1.5	0.9	2.4
Appliances								
No	33.1	32.8	42.7	14.9	36.3	43.4	25.8	38.2
Yes	65.0	66.7	52.3	83.8	61.3	55.1	73.4	59.3
Not a de jure resident	1.9	0.5	4.9	1.3	2.3	1.5	0.9	2.4
Two leg mobility								
No	71.6	88.9	80.1	38.1	72.2	56.6	47.7	46.2
Yes	26.5	10.6	15.0	60.5	25.5	41.8	51.4	51.4
Not a de jure resident	1.9	0.5	4.9	1.3	2.3	1.5	0.9	2.4
Four leg mobility								
No	88.5	88.8	93.4	88.1	94.7	96.7	90.3	92.5
Yes	9.6	10.8	1.7	10.5	3.0	1.7	8.8	5.1
Not a de jure resident	1.9	0.5	4.9	1.3	2.3	1.5	0.9	2.4
Housing								
Low	2.1	13.9	24.0	12.1	52.5	15.5	20.2	25.8
Medium	40.4	18.2	21.7	24.4	41.0	39.1	31.0	30.9
High	55.4	66.7	48.9	61.9	4.2	43.8	47.9	40.8
Other	2.1	1.2	5.4	1.5	2.3	1.6	-	2.4

§ Countries with highest and lowest 2015 GDP ranking respectively in each sub-region except North Africa § Countries with highest and lowest 2015 GDP ranking respectively in each sub-region except North Africa

As shown in Table 2, the result of the Wealth Index shows that only Angola and Malawi have more children in the "rich" category (52.6% and 41.7% respectively). The rest of the countries (Congo-Brazzaville 72.6%; Kenya 55%; Gambia 50.2%; Comoros 47.8%; Zambia 47.7%; and Nigeria 45.9%) have more children in the "poor" category. In all countries, the number of children who dwelled in rural areas was compared to those who dwelled in the urban areas, with the highest being 74.2% in Congo-Brazzaville, and the least being 62.9% in Zambia. In the case of highest education obtained by the parents, Gambia fared worst with 63.6% of parents having no education, followed by Nigeria with 46.9%, and Comoros with 44.7%. Countries where parents have some primary education, included Malawi, Angola, Zambia, Kenya, with 66.6%, 55.9%, 55.6%, and 52.7% respectively, while Congo-Brazzaville is the only country with a higher percentage of parents (48.1%) having some secondary education. Generally, in all countries, the percentage of parents with higher education was low.

In the case of source of drinking water, 87% in Gambia obtain their drinking water from a protected source, 82.9% in Malawi, 74% in Comoros, while in Zambia, Kenya, and Nigeria, the figures are 56.5%, 55.5%, and 53.8% respectively. On the other hand, in Congo-Brazzaville and Angola, the value is put at 47.1% and 46% respectively. Other major sources are from unprotected sources. Regarding the time to get to a water source, in Comoros, 62.1% of respondents have the drinking water sources on their premises, while in Congo-Brazzaville and Kenya, 38% and 30% respectively (which form the majority of respondents), get to the source of their drinking water in between 21 and 60 minutes. The remaining countries show that the majority get to the source of drinking water in between 6 and 20 minutes. However, there was no response from Angola. On toilet facilities, in Angola, a majority of 43.2% indicated that they have no toilet, while in other countries, results show that the pit toilet is overwhelmingly predominant.

On electricity, except in Comoros where 63.5% indicated that they do not have electricity, results show that all other countries have electricity, with the highest value from Malawi (85.7%), and the least from Nigeria (52.8%). Sequel to this, many households possess appliances, with Gambia recording the highest at 83.8%, and Congo-Brazzaville recording the least at 52.3%. More households are mobile with a two-leg mobile device in Comoros (88.9%), Congo-Brazzaville (80.1%), Kenya (72.2%), Angola (71.6%), and Malawi (56.6%). On the other hand, most households are in possession of at least a four-leg mobile device. Regarding housing conditions, except for respondents in Kenya whose condition of dwelling places are low, all other countries indicated high conditions of dwelling places.

Table 3: Correlations of Indicators of Child Wealth Index in Africa[§]

	Angola	Comoros	Congo-Braz	Gambia	Kenya	Malawi	Nigeria	Zambia
Residence	-0.482**	-0.262**	-0.683**	-0.681**	-0.457**	-0.486**	-0.566**	-0.641**
Highest education	0.461**	0.407**	0.360**	0.252**	0.481**	0.392**	0.636**	0.449**
Educational attainment	0.469**	0.413**	0.376**	0.258**	0.515**	0.400**	0.648**	0.473**
Source of drinking water	-0.237**	0.031	-0.391**	-0.171**	-0.252**	-0.142**	-0.224**	-0.348**
Time to get to water source	-	0.172**	0.244**	0.425**	0.269**	0.177**	-0.046**	0.216**
Toilet	-0.578**	-0.188**	-0.283**	-0.502**	-0.506**	-0.249**	-0.351**	-0.406**
Electricity	0.522**	0.630**	0.668**	0.607**	0.622**	0.400**	0.663**	0.582**
Appliances	0.594**	0.563**	0.387**	0.205**	0.452**	0.409**	0.422**	0.456**
Two-leg mobility	0.122**	0.215**	-0.002	0.013	0.162**	0.190**	-0.024**	0.007
Four-leg mobility	0.269**	0.329**	0.121**	0.261**	0.189**	0.120**	0.300**	0.268**
Housing	0.405**	0.488**	0.461**	0.514**	0.603**	0.794**	0.773**	0.695**

**   Significant at 1% level

[§] Countries with highest and lowest 2015 GDP ranking respectively in each sub-region except North Africa

Table 3 shows that significant correlations at a 1% level exist between the Child Wealth Index and the indicators in all countries. The correlation is negative with residence, with the highest in Congo-Brazzaville (-0.683), Gambia (-0.681), Zambia (-0.641), and Nigeria (-0.566), and the least in Comoros (-0.262). With the highest education and educational attainment, the correlation is positive with the highest in Nigeria (0.636 and 0.648 respectively), and the least in Gambia (0.252 and 0.258 respectively). Except for Comoros, the Child Wealth Index is negatively correlated with source of drinking water. None of the correlations, however, is high. On time to get to a water source, there was no result for Angola, since there was no response recorded. However, except for Nigeria, for which the correlation is negative, all other countries are positively correlated. In the same vein as the source of drinking water, none of the correlations is high. In the case of toilet facilities, Child Wealth Index is found to be negatively correlated with having toilet facilities. The correlation is the highest in Angola (-0.578) and the least in Comoros (-0.188).

Furthermore, Child Wealth Index is found to be positively correlated with electricity, with Congo-Brazzaville having the highest (0.668) and Malawi the lowest correlation (0.400). In the same vein, Child Wealth Index shows a positive correlation with ownership of appliances, with Angola on the highest side (0.594), while Gambia has the lowest correlation (0.205). On ownership of two-leg mobility, except for Congo-Brazzaville and Nigeria, all other countries show positive correlations with Child Wealth Index. However, the correlations are all very low. The same low correlations apply in the case of ownership of four-leg mobility, except that they are all positively correlated with Child Wealth Index.

Finally, correlating Child Wealth Index with housing showed positive correlations in all countries under observation. The highest correlation was found with Malawi (0.794), while Angola indicated the lowest (0.405) among the countries observed.

Table 4: Odd Ratios of Indicators of Child Wealth Index in Africa[§]

		Angola	Comoros	Congo-Braz	Gambia	Kenya	Malawi	Nigeria	Zambia
Rich	**Highest education**	2.002***	1.315***	1.924***	0.990	1.543***	2.174***	2.307***	1.876***
	Time to get to water source	-	1.001***	1.001***	1.001***	1.001***	1.001**	1.000*	1.001***
	Housing	3.183***	4.366***	3.034***	2.111***	5.174***	30.310***	7.029***	5.988***
	Residence								
	Urban	0.077***	1.643***	4.416***	9.352***	2.440***	7.818***	2.341***	5.205***
	Rural	-	-	-	-	-	-	-	-
	Source of drinking water								
	Protected water source	1.058	1.063	0.473**	0.473	1.308	5.87E+05***	1.724	1.125
	Unprotected water source	0.417	0.834	0.248***	0.137***	0.889	2.92E+05***	0.912	0.568
	Delivery water source	1.235	1.398	-	-	2.072**	-	2.247	3.722
	Packaged water source	1.69E+07	5.76E+09***	1.20E+05	1.96E+05	4.088	-	13.881***	5.015*
	Other	-	-	-	-	-	-	-	-
	Toilet								
	Modern	2.736**	227.217***	2.02E+05***	6.82E+05***	8.114**	55266.420	4180.075***	2.00E+07***
	Pit	2.505**	39.524***	21249.108***	1.19E+05***	1.998	0.404	482.437***	1.02E+06***
	Open	1.018	37.348***	23705.997***		0.638	0.017	2445.570***	1.67E+06***
	None	0.729	1.927	4922.999***	3.748	0.342	0.092**	466.368***	2.88E+05***

		Angola	Comoros	Congo-Braz	Gambia	Kenya	Malawi	Nigeria	Zambia
	Other	-	-	-	-	-	-	-	-
	Electricity								
	No	13.012**	0.142***	0.002***	9.103E-05***	141.495***	0.004***	0.018***	0.000***
	Yes	80.107***		0.072***	0.000***	1551.661***	-	0.097***	0.006***
	Not a de jure resident	-	-	-	-	-	-	-	-
	Appliances								
	No	0.232***	0.271***	0.053***	0.480***	0.257***	0.511**	0.053***	0.198***
	Yes	-	-	-	-	-	-	-	-
	Not a de jure resident	-	-	-	-	-	-	-	-
	Two-leg mobility								
	No	0.893	0.503***	0.618**	1.089	0.551***	0.613**	1.094*	0.699***
	Yes	-	-	-	-	-	-	-	-
	Not a de jure resident	-	-	-	-	-	-	-	-
	Four-leg mobility								
	No	0.134***	0.261***	0.061***	0.360***	0.114***	0.280	0.280***	0.042***
	Yes	-	-	-	-	-	-	-	-
	Not a de jure resident	-	-	-	-	-	-	-	-
Poor	**Highest education**	0.710***	0.733***	0.437***	1.116**	0.464***	0.571***	0.375***	0.518***
	Time to get to water source	-	0.999***	0.999***	1.000**	0.999***	1.000**	1.000**	0.999***

		Angola	Comoros	Congo-Braz	Gambia	Kenya	Malawi	Nigeria	Zambia
	Housing	1.313***	0.246***	0.220***	0.386***	0.200***	0.130***	0.098***	0.214***
	Residence								
	Urban	0.124***	0.637**	0.098***	0.277***	0.933	0.376***	0.650***	0.106***
	Rural	-	-	-	-	-	-	-	-
	Source of drinking water								
	Protected water source	1.47E+08	0.696	0.562*	0.448	0.722	3.511E-16	0.539	3.786
	Unprotected water source	1.94E+08	0.475**	3.502***	0.513	1.503**	3.392E-16	0.791	6.950**
	Delivery water source	1.19E+08	0.546	-	-	1.081	-	0.307	4.956
	Packaged water source	9.85E+11	9.94E+07[h]	84.108	2.934	0.559	-	0.014**	0.843
	Other	-	-	-	-	-	-	-	-
	Toilet								
	Modern	0.143***	0.019***	0.430	3.050	0.369	6.259	0.394	2.49E+05
	Pit	0.173***	0.016***	7.998	3.824	0.643	0.526	5.755	4.91E+05
	Open	0.296***	0.013***	11.624*		0.796	0.359	0.643	1.05E+06
	None	1.227	0.006***	26.846**	9.383	7.946**	0.684	2.805	7.08E+05
	Other	-	-	-	-	-	-	-	-
	Electricity								
	No	2.121E-15	5.530***	0.001***	0.015**	0.001***	1.91E+07	0.004***	7.225E-14
	Yes	2.849E-17		1.878E-05***	0.013**	0.000***	-	0.001***	4.749E-15
	Not a de jure resident	-	-	-	-	-	-	-	-
	Appliances								

		Angola	Comoros	Congo-Braz	Gambia	Kenya	Malawi	Nigeria	Zambia
	No	3.178***	3.369***	4.267***	2.360***	3.922***	3.413***	2.752***	6.030***
	Yes	-	-	-	-	-	-	-	-
	Not a de jure resident	-	-	-	-	-	-	-	-
Two-leg mobility									
	No	2.022***	1.329	2.498***	2.704***	2.275***	2.615***	0.968	1.722***
	Yes	-	-	-	-	-	-	-	-
	Not a de jure resident	-	-	-	-	-	-	-	-
Four-leg mobility									
	No	$6.41\text{E}+05^{h}$	2.434**	6.974***	4.237***	3.303**	$5.14\text{E}+06^{h}$	3.478***	81341.427
	Yes	-	-	-	-	-	-	-	-
	Not a de jure resident	-	-	-	-	-	-	-	-

The reference category is: middle.

***   Significant at 1% level
**   Significant at 5% level
*   Significant at 10%
h   Hessian matrix is singular
-      Redundant category
§   Countries with highest and lowest 2015 GDP ranking respectively in each sub-region except North Africa

In Table 4, the analyses of the multinomial logistic used the middle category in the Child Wealth Index as the reference category. For highest education, in the rich category, the odds in Gambia are not significant at any level. In all countries, the odds for highest education at 1% level of significance show that a child is more likely to be rich if his or her parents are educated. This likelihood increases from Comoros (1.315 times more likely) to Nigeria (2.307 times more likely). On time to get to a water source, except for Angola where no observation was recorded, the odds in all countries show that a child is more likely from a rich home by 1.001 times, except for Nigeria, that is 1.000 times. However, except for Nigeria and Malawi of which significance levels are at 10% and 5% respectively, all other countries are at a 1% level of significance. In the case of housing, results show that in all countries, at a 1% level of significance, a child is more likely from a rich background. The likelihood moves from Gambia (2.111 times more likely) to Malawi (30.310 times more likely).

With regards to residence, except for Angola, the odds for a child coming from a rich home are more likely in the urban areas than in the rural areas at a 1% level of significance, with the likelihood increasing from Comoros (1.643 times more likely) to Gambia (9.352 times more likely). On source of drinking water, the odds for a child coming from a rich home are 0.473 times less likely in Congo-Brazzaville, and 5.87e+05 times more likely in Malawi at a 5% and 1% level of significance respectively, in the case of a protected water source. Also, in the case of an unprotected water source, at a 1% level of significance, a child is 0.248 times and 0.137 times less likely to come from a rich background in Congo-Brazzaville and Gambia respectively, while in Malawi, he or she is 2.92e+05 more likely. In the case of delivery water source, a child in Kenya is 2.072 more likely from a rich background at a 5% level of significance, while the result of packaged water source indicates that at a 1% level of significance, a child is 13.881 times and 5.76e+09 times more likely from a rich home in Nigeria and Comoros respectively, while at a 10% level of significance, a child is 5.015 times more likely from a rich home in Zambia.

In many countries, toilet facilities show to be one of the major factors indicating the Child Wealth Index. Results from all countries, except Malawi, indicate that the odds of modern toilet facilities show that a child is more likely from a rich background. At a 1% level of significance, the likelihood increases from Comoros (227.217 times more likely) to Nigeria (4180.075 times more likely), while at a 5% level of significance, it is 2.736 times and 8.114 times more likely in Angola and Kenya respectively. In the same vein, ironically, results from some countries further show that other forms of toilet facilities indicate an increased likelihood of a child coming from a rich background. Such significant indications are noticed in pit toilet (all countries except Kenya and Malawi), open toilet (Comoros, Congo-Brazzaville, Nigeria, and Zambia), and no toilet facility (Congo-Brazzaville, Malawi, Nigeria, and Zambia).

On electricity, except for Kenya and Angola, a child is less likely from a rich home because he or she does not have electricity at home. However, in Kenya and Angola, a

child is 1551.661 times and 80.107 times respectively more likely to come from a rich background for having electricity at home, both at a 1% level of significance, than 141.495 times at a 1% level of significance and 13.012 times at a 5% level of significance more likely to come from a rich background, given that there is no electricity at home. While speaking of appliances, all the countries indicated that for not having appliances at home, a child is less likely from a rich home, with Congo-Brazzaville and Nigeria most unlikely at 0.053 times at a 1% level of significance, and Malawi least unlikely at 0.511 at a 5% level of significance.

As for ownership of two-leg mobility, only Nigeria indicated 1.094 times at a 10% level of significance more likelihood that a child is from a rich background if the family does not own one. Other results, except for Angola and Gambia (which have no significant result), show that a child is less likely from a rich background if the family does not possess two-leg mobility. Also, results of the four-leg mobility show that except for Malawi, a child is less likely at a 1% level of significance, from a rich background if the family does not own one.

More results in Table 3 consider the poor category. In the case of highest education, except for Gambia, a child is less likely from a poor background at a 1% level of significance if his or her parents are educated. The less likelihood moves from Comoros (0.7333 times less likely) to Nigeria (0.375). Also, except for Angola where there was no observation, the results on time to get to a water source shows that in Comoros, Congo-Brazzaville, Kenya, and Zambia, a child is 0.999 times at a 1% level of significance respectively less likely from a poor background given the distance to get to a water source. On the other hand, in Gambia, Malawi, and Nigeria, a child is 1.000 times at a 5% level of significance more likely from a poor background given the distance he or she has to cover to get to a water source. As for housing, except for Angola, a child is less likely from a rich home at a 1% level of significance given the condition of housing.

On the effect of residence, results show that in all the countries, except Kenya, a child is less likely at a 1% level of significance (5% level of significance for Comoros) from a poor home if he or she lives in an urban area. The results for protected water source show that at a 10% level of significance, a child from Congo-Brazzaville is 0.562 times less likely from a poor home if he gets drinking water from a protected source. As for the case of an unprotected water source, in Comoros, a child is 0.475 times at a 5% level of significance less likely to come from a poor home if he or she gets drinking water from an unprotected water source, while in Kenya and Zambia, a child is 1.503 times and 6.950 times respectively at a 5% level of significance more likely from a poor home if he or she gets drinking water from an unprotected water source. Also, in Congo-Brazzaville, a child is 3.502 times at a 1% level of significance more likely from a poor home given that drinking water is from an unprotected source. No significant result was obtained in the case of delivery water source, whereas as for packaged water source in

Nigeria, a child is 0.014 times at a 5% level of significance less likely from a poor background if he or she gets his or her drinking water from a packaged source.

As for toilet facilities, results for modern and pit toilet system, only Angola and Comoros at a 1% level of significance, show less likelihood of a child being from a poor background. While in the open toilet system, while Angola and Comoros at a 1% level of significance, show less likelihood of a child being poor, results from Congo-Brazzaville show a child is 11.624 times at a 10% level of significance more likely poor. However, for a home with no toilet facility, a child in Comoros is 0.006 times at a 1% level of significance less likely to be poor, while at Congo-Brazzaville and Kenya, a child is 26.846 times and 7.946 times at a 5% level of significance respectively more likely to be poor.

In the case of electricity, a child in Comoros is 5.530 times at a 1% level of significance more likely to be poor if he or she has no electricity to use. But in Gambia, a child is 0.015 times at a 5% level of significance less likely to be poor, while in Congo-Brazzaville, Kenya, and Nigeria, he or she is 0.001 times, 0.001 times, and 0.004 times at a 1% level of significance less likely to be poor if there is no electricity to use. For those that have electricity to use, significant results show that at a 1% level of significance in Congo-Brazzaville, Kenya, and Nigeria, and at a 5% level of significance in Gambia, a child is less likely to be poor. As regards ownership of appliances at home, all results show that at a 1% level of significance, a child is more likely to be poor if he or she does not have electrical appliances at home. The likelihood increases from Gambia (2.360 times more likely) to Zambia (6.030 times more likely).

On ownership of a two-leg mobile device, except for Comoros and Nigeria, at a 1% level of significance, a child is more likely to be poor if the family does not own a two-leg mobile device, increasing from Zambia (1.722 times more likely) to Gambia (2.704 times more likely). While on the other hand, ownership of a four-leg mobile device shows that at a 1% level of significance, Congo-Brazzaville, Gambia, and Nigeria, a child is 6.974 times, 4.237 times, and 3.478 times respectively more likely to be poor if the family does not possess a four-leg mobile device. In the same vein, at a 5% level of significance, in Comoros and Kenya, a child is 2.434 times and 3.303 times more likely to be poor if the family does not own a four-leg mobile device.

Concluding Remarks

This study set out to assess the impact of Child Wealth Index in Africa. The study, however, considered four out of the five regions of the continent. This is due to the fact that the North African region is not included in the Demographic and Health Survey. In each of the four regions considered, two countries were selected for the study; namely the countries with the highest and lowest GDP.

Observations from the results show that the majority of countries have more children in the poor category, with the highest percentage in Congo-Brazzaville. These are more

situated in rural areas in comparison to urban areas. Also, countries where parents have some level of education have more children in the rich category, especially in Malawi and Angola, while countries whose parents have no level of education have more poor children. This agrees with Handa (1996) and Pufall et al. (2016) that parents' education significantly determines a child's schooling. An implication from this study reveals a significant relationship between Child Wealth Index and education. Other indicators such as time to get to a water source, source of drinking water, and toilet facilities were found not to have a significant impact on Child Wealth Index in all countries in this study, except for Nigeria. In Comoros, toilet facilities were found to have an impact on Child Wealth Index. Hence, these results also infer that source of drinking water, toilet facilities, and time to get to a water source, are less likely determinants or assessment of Child Wealth Index. Finally, electricity and housing were likewise found to be determinants of Child Wealth Index.

In conclusion, this study has shown that education and household economic indicators are the most likely indicators of choice to determine a child's economic status. Most especially, parents' education has more impact on raising a child's Wealth Index. The recommendation from this study is that governments at all levels should encourage more enrolment in schools, and if possible, provide free education to some level of education, particularly the secondary level.

Acknowledgements

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