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Determinants of Child Poverty in Rural Nigeria: A Multidimensional Approach

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Determinants of Child Poverty in Rural Nigeria: A Multidimensional Approach

Adeoti Adetola [α] & Popoola Olufemi [σ]

Abstract - The profiles and determinants of child poverty in rural Nigeria were identified using the Demographic and Health Survey, 2008 data. The multidimensional child poverty concept was applied to children under-5 years of age. In all, a total of 4,543 children were analyzed. About half of the children were male and the mean age for all the children is 29 months old.

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The logistic regression model result revealed that the factors that decrease the probability of child poverty are: parent's higher education, employment of household head in the service sector, male-headed households, 'rich' households and presence of a health facility . Conversely, factors that increase the probability of child poverty are large household size, households engaged in agriculture and children living in the south-south zone.

The multidimensional child poverty index of 0.526 is too high in rural Nigeria; and effort to eradicate child poverty should be multifaceted. These include encouraging higher education for parents, provision of more health and sanitation infrastructure, promotion of family planning to reduce household size and improvement in agricultural productivity and incomes. .

Keywords : Poverty, Under-5 children, Alkire and Foaster approach, Multiple Correspondence Analysis, logistic regression, Rural Nigeria.

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I. Introduction

Children are the most vulnerable in the society and are such mostly affected by the incidence of poverty, especially those whose ages range from 0 to 15 years. According to UNICEF, child poverty means children, who experience deprivation of the material resources needed to survive, develop and thrive, leaving them unable to enjoy their rights, achieve their full potential, or participate as full and equal member of the society. One of every three children in the developing world lacks access to basic sanitation, and one of every five has no access to safe drinking water (UNICEF, 2009). About 600 million children worldwide are growing up in absolute poverty and over ten million children under-five years of age die every year (Insights Development Research, 2005). Every year, nearly 10 million children die from largely preventable causes (UNICEF, 2011). These include illnesses such as pneumonia, diarrhea and malaria, as well as conflict and HIV/AIDS. Malnutrition, poor hygiene, lack of access to safe water and adequate sanitation contribute to more than half of these deaths (UNICEF, 2005). More than 90% of child death under the age of 18 occur before the age of five (UNDG, 2003). Ninety-three percent of all under-five deaths currently occur in Africa and Asia combined and 40% occur in just three countries: India, Nigeria and the Democratic Republic of Congo. (UNICEF, 2008).

Children in Nigeria often face many problems such as poor health, lack of access to quality education, food and social insecurity and lack of care. In Nigeria, child poverty is typical both in urban and rural areas. Children living in rural areas are deprived of useful and beneficial resources. Mostly they have access to rivers and other surface water only, no access to modern toilets, limited access to immunizations and medical advice, living in dwelling with more than five people per room, no school attendance, no access to newspaper and other media. Nigeria among other developing countries of the world needs to tackle child poverty (Gordon D. et al 2003).

Majority of Nigerians are barely surviving financially with 70.2 per cent living below US$ 1 a day (UNDP, 2005). Poverty rate has increased from an average of 27 per cent in the 1980s to over 70 per cent in 2003 (African Economic Outlook, 2005). A national poverty survey carried out indicates that the high tropic

areas have moderate poverty while the northern regions have poverty levels that are as high as 60% (Odusola, 1997; Okunmadewa et al., 2005; NBS, 2009) with higher incidence in the rural areas

Several authors have considered poverty using the uni-dimensional approach, only few have adopted the multidimensional approach, Estimating child poverty from a multidimensional perspective is recent and few. The different dimensions of poverty remain a challenge to choosing the appropriate poverty measure and indicators Whereas the choice of a specific poverty measure may have major consequences for poverty reduction, some measures may better identify specific poverty situations than others (Hagenaars&Vos 1988; Laderchi et al., 2003).

This paper examines the incidence and determinants of child poverty in rural Nigeria. It estimates poverty among children of less than five years old. Literature on child poverty considered from the multidimensional perspective in Nigeria is rare. However, various studies conducted on poverty in Nigeria in the past include World Bank (2008), Onah (1996), Echeberi (1997) Ogwumike and Ekpeyong (1996), Anyanwu (l997), Odusola (1997), Englama and Bamidele (1997). None of them quantified the specifics of child poverty and the factors that influence it. An exception is the Global Study on Child Poverty and Disparity by UNICEF which employed the use of the MICS 2007 to examine well being in children. The Alkire and Foster methodology has an added advantage to previous multidimensional measures as it introduces a dual-cutoff identification method, while its aggregation methodology builds on the traditional FGT approach. Also, the depth and severity of poverty can be estimated using a multidimensional approach.

II. Objectives

The broad objective of this paper is to examine the incidence and determinants of child poverty in rural Nigeria. The specific objectives are to:

- Describe the socio-economic characteristics of under-five children.
- Identify the dimensions of child poverty.
- Profile the poverty status of the children
- Identify the determinants of child poverty

III. Literature Review on Child Poverty

Bristol approach adopted by the Global study (UNICEF, 2007)- aligned child poverty measurement with the child rights approach and implement indicators and cutoffs for child poverty that reflected the definition agreed in the World summit. This was used to produce a large number of child poverty estimates across a large number of developing countries (Gordon et al, 2003; Gordon et al., 2001; UNICEF, 2004). The studies used the DHS data which can be replicated with MICS data. It belongs to the counting tradition of poverty measures which reports the headcount or percentage of children who are multidimensionally poor. It has the advantage of being easy to estimate and interpret; but does not provide information on the depth and severity of poverty Delamonica and Minujin (2007) and Alkire and Foster (2007, 2011).

The Alkire- Foster (AF) method (2007,2011) combines the counting approach (Gordon et al., 2003 with the literature on axiomatic approaches to multidimensional poverty in welfare economics (Bourguignon and Chakravarty, 2003; Alkire, 2008). It provides multidimensional measure that reflects the intensity of poverty.It also reveals the depth and severity of multidimensional poverty.

In Nigeria, the UNICEF study using the MICS 2007 data used both the income/consumption and the deprivation approach to estimate child poverty and deprivations. The use of the income/consumption approach is based on the premise that the household poverty affect children in those households; being the most vulnerable. However, since all indicators of poverty cannot be captured based on money- metric measures, they also adopted the deprivation approach. In the deprivation approach, the seven areas considered as very basic for child survival, growth and development are shelter, sanitation, water, information, food and nutrition, education and health. The study used a set of threshold to categorize Nigerian children into levels of deprivation. Deprivation in each of these areas exists at two levels namely severe and less severe. The term 'absolute poverty' has also been used to describe a situation where children suffer at least two deprivations.

Alkire S and Manuel Roche. J (2011) measured child poverty in Bangladesh using four rounds of the DHS data for the period 1997-2007 and estimated the headcount, breadth, and severity of the various dimensions of child poverty. The selected indicators for children under - five are nutrition, water, sanitation, health, shelter and information. The results show that the Alkire-Foster adjusted headcount ratio produces different ranking than the simple headcount, because it reflects the simultaneous deprivations children experience.

Santos Emma and Karma Ura (2008) estimated multidimensional poverty in Bhutan using the Alkire and Foster (2007) methodology. With data from the Living Standard Survey, five dimensions were considered for estimation in rural and urban areas with additional two for rural areas. The study employed two alternative weighting systems: equal weights and weights derived from Gross National Happiness Survey. The dimensions considered are income, education, room availability, access to electricity and access to drinking water. For rural areas, access to roads and land ownership was

added. The estimates are decomposed into rural and urban areas, by dimension and between districts. The results show that the contribution of each dimension is dependent on the weighting system. Also, the ranking of districts was found to be robust for a wide range of poverty cut-offs. The methodology is suggested as a potential formula for national poverty measurement as well as a tool for budget allocation among districts and dimensions.

Batana (2008) used the Alkire and Foster (2007) method to estimate multidimensional poverty in fourteen sub–saharan African countries. Identification of who is poor and who is not poor is based on four dimensions-assets, health, schooling and empowerment. Four main results include: Firstly, there are important cross-country differences in multidimensional poverty, Secondly, the ranking of countries based on the Alkire and Foster (2007) multidimensional poverty measure differs from the rankings based on standard welfare measures (HDI and Income poverty). Thirdly, decomposition of multidimensional poverty is more prevalent in rural than urban areas. Finally, decomposition of poverty by dimensions indicates that lack of schooling is the key contributor to multidimensional poverty.

Alkire and Suman (2009) applied the dual cutoff approach to study multidimensional poverty in India. They found that 60 percent of the poor households identified under the AF multidimensional poverty measurements were not included in india's social assistance program that targets the poor households as identified by comparing their income with official income poverty line. Alkire and Suman (2009) also illustrated the policy value of decomposable Alkire and Foster multidimensional poverty measures: to inform multisectoral planning by identifying local priorities for public investment. Based on the results, they concluded that the Alkire and foster (2007) approach can be used to access dimensions that drive multidimensional poverty in different contexts.

Kabubo M. et al (2010) used the DHS data for the period 1993 to 2003 to estimate multidimensional poverty for mothers and children in Kenya. Two dimensions of well being were considered in their estimation of multidimensional poverty which are assets and health. First, a composite poverty indices for asset was estimated using the MCA and secondly the multidimensional poverty indices were estimated and ordered; using the Alkire and Foster (2007) methodology. The determinants of poverty was isolated by use of the bi-probit model.

IV. Methodology

a) Scope of Study

Nigeria is the most populous country in Africa and the ninth most populous country in the world providing habitation for 1.9% of the world's population as at 2005. There is a forecast that this will rise to 2.2% in 2015, and attain the sixth most populous country rank by 2050. The National Population Commission (NPC) put the population of Nigeria at about 88.5 million in 1991 and 140 million in 2006 (FRN, 2007). The 2006 census estimates further claims that 42.3% of the population is between 0 and 14 years of age, while 54.6% of the population is 15 to 65 years of age. The birth rate is significantly higher than the death rate at 40.4 and 16.9 per 1000 people respectively. The study area is rural Nigeria. Nigeria is made up of 36 states and a Federal Capital Territory (FCT), grouped into six geopolitical zones: North Central, North East, North West, South East, South South, and South West.

b) Source and Type of Data

The study used secondary data comprising mainly of the Demographic and Health Survey (DHS) data collected by Macro International in 2008. The DHS survey data is a national representative data. It contains rich demographic data and few relevant socio-economic data on households and household assets. It provides data on the welfare of children and adult in households.

c) Analytical Technique

i. Alkire-Foster Approach

Alkire and Foster's (2007) methodology includes two steps: an identification method (ρk) that identifies 'who is poor' by considering the range of deprivations they suffer, and an aggregation method that generates an intuitive set of poverty measures $(M\alpha)$ (based on traditional FGT measures) that can be broken down to target the poorest people and the dimensions in which they are most deprived. It also proposes two additional measures in the same class of multidimensional poverty measures: the adjusted poverty gap and the adjusted FGT measure, which are sensitive to the depth of deprivation in each dimension, and the inequality among the poor.

a. The notation

Let $y = [y_{ij}]$ denote the $n \times d$ matrix of achievements, where n represents the number of children, d is the number of dimensions, and $y_{ij} \geq 0$ is the achievement of child $i = 1, 2, \ldots, n$ in dimension $j = 1,2,\ldots d$. Each row vector $y_i = y_{i1}, y_{i2}, \ldots, y_{id}$ lists child i's achievements, while each column vector $y_{\circ j} = y_{1j}, y_{2j}, \ldots y_{nj}$ gives the distribution of dimension j achievements across the set of children. Let $z_j > 0$ denotes the cutoff below which a child is considered to be deprived in dimension j and let z be the row vector of dimension specific cutoff. The expression $/v/$ denotes the sum of all the elements of any vector or matrix v, and $\mu(v)$ represents the mean of $/v/$, or $/v/$ divided by the total number of elements in v.

For a given matrix of achievements y, it is possible to define a matrix of deprivation $g^0 = [g_{ij}^0]$ whose

typical element g_{ij}^0 is defined by $g_{ij}^0 = 1$ when $y_i < z_j$ while $g_{ij}^0 = 0$ otherwise. Hence, g^0 is a $n \times d$ matrix whose ij^{th} entry is 1 when child i is deprived in Dimension j, and 0 otherwise according to each dimension cutoff z_j. From this matrix, we can construct a column vector c of deprivation counts, whose i^{th} entry $c_i = /g_i^0/$ represents the number of deprivations suffered by child. Notice that the matrix and vector can be defined for any ordinal and cardinal variable from the matrix of achievements y

b. Identification method

Following Alkire and Foster (2007), the vector c of deprivation counts is compared against a cutoff k to identify the poor, where $k = 1...d$. Hence, the identification method ρ is defined as $\rho_k(y_i;z) = 1$ whenever $c_i \geq k$, and $\rho_k(y_i;z) = 0$ whenever $c_i < k$. Finally, the set of children who are multidimensional poor is defined as $Z_k = \{i : \rho_k(y_i;z)\}$. In other words, the method identifies as poor any child who is deprived in more than k number of dimensions. Alkire and Foster (2007) refers to ρ_k as a dual cutoff method because it first applies the within dimension cutoff z_j to determine who is deprived in each dimension, and then the across dimension cutoff k to determine the minimum number of deprivations for a child to be considered multidimensional poor.

They identify *absolute poverty as* those children who suffer from at least two or more deprivations (equivalent to $k = 2$), and as in *severe deprivation* those who suffer from at least one deprivation (equivalent to $k = 1$). Naturally, the decision regarding the across dimension cutoff depends on various factors including the number and type of indicators involved in the analysis. The Alkire-Foster method formulates more explicitly the dual cutoff method and allows us to compare the results according to different cutoff values in order to carry out sensitivity analysis.

c. Multidimensional poverty measure

The first measure to consider is the *headcount ratio* or the percentage of children that is poor. The headcount ratio $H = H(y;z)$ is defined by:

$$H = q/n \qquad (1)$$

Where $q = q(y;z)$ is the number of children in the set z_k as identified using ρ_k the dual cutoff method. Alkire and Foster (2007) proposed a headcount measure that is adjusted by the average number of deprivations experienced by the poor. To this end, a censored vector of deprivation counts c_k is defined so that if $c_i \geq k$, *then* $c_i(k) = c_i$; and if $c_i < k$, *then* $c_i(k) = 0$. This is to say that in $c(k)$ the count of deprivations is always zero for those children that are not poor according to the ρ_k dual cutoff method, while children that were identified as poor keep the original vector of deprivation counts c_i. Then, $c_i(k)/d$ represents the shared possible deprivations experienced by a poor child i, and hence the average deprivations shared across the poor is given by

$$A = /c(k`qd) \qquad (2)$$

Notice that this is different to Delamonica and Minujin (2007). They propose to measure the average deprivations across the whole population instead of across those who are identified as multidimensional poor. By focusing on the poor the Alkire - Foster Foster approach allows computing a final adjusted headcount ratio that satisfies the properties of decomposability and poverty focus. The (dimension) adjusted headcount ratio $M_0(y;z)$ is given by:

$$M_0 = HA \qquad (3)$$

or simply the product of the headcount ratio H and the average deprivation shared across the poor A. The (dimension) adjusted headcount ratio clearly satisfies dimensional monotonicity, since A rises when a poor child becomes deprived in an additional dimension.

In addition, similar to the headcount ratio H, M_0 satisfies decomposability, replication in variance, symmetry, poverty and deprivation focus, weak monotonicity, non-triviality, normalization and weak rearrangement (Alkire and Foster 2007). The Bristol approach measures child poverty with the headcount ratio H which is not sensitive to the breadth of multidimensional poverty. An attractive property of M_0 is that it can be decomposed by population subgroup. The decomposition is obtained by:

$$M_0(x,y;z) = \frac{n(x)}{n(x,y)} M_0(x;z) + \frac{n(y)}{n(x,y)} M_0(y;z) \qquad (4)$$

Where x and y are the distribution of two subgroups (x,y), the distribution obtained by merging the two; $(n(x)$ the number of children in x, $n(y)$ the number of children in y, and $n(x,y)$ the number of children in $n(x,y)$. In other words, the overall poverty is the weighted average of subgroup poverty levels, where weights are subgroup population shares. This decomposition can be extended to any number of subgroups. In addition, it is also possible to break down overall multidimensional poverty measure to reveal the contribution of each dimension j to it. Once the identification step has been completed a censored matrix of deprivations g^0 (k) is defined whose typical entry is given by $g^0_{ij}(k) = g_{ij}^0$ for every i satisfying $c_i \geq k$, while $g^0_{ij}(k)$ for i with $c_i < k$. Then, $M_0(y;z)$ can be break-down into dimensional groups as:

$$M_0(x,z) = \sum_j \mu(g_{0j}^0(k))/d \qquad (5)$$

Consequently, $(1/d)\ \mu\ (g_{0j}^0(k)/M_0(y;z)$ can be interpreted as the post-identification contribution of dimension j to overall multidimensional poverty.

Dimensions and Cutoffs

In this methodology, the deprivation cutoffs zj and the poverty cutoff k are considered.

The dual cutoffs in this approach are quite different from one another. Cutoffs like zj have long been used to identify deprivations in a dimension of interest. Consequently, in many variables there is a general understanding of what a given cutoff level means and how to go about selecting it (Sen (1981), Ravallion (1994), Foster and Sen (1997), Bourguignon and Chakravarty (2003), and Foster (2006). To be sure, any specific choice of z, no matter how well grounded, is somewhat arbitrary and should be subject to robustness tests — say, by evaluating poverty levels for a grid of nearby cutoffs (Duclos et al., 2007). But selecting reasonable levels for z should not be an unduly taxing exercise. The poverty cutoff k, by comparison, may seem less tangible, since it resides in the space between dimensions rather than within a specific domain. This sense is reinforced by the relative lack of attention that has been paid to the identification step: apart from the union and intersection approaches, specific multidimensional identification procedures are not typically given in the literature. But the identification method ρk and its parameter k provide a concrete solution to identification that can be readily grasped, especially in the equal-weighted 'counting' case that focuses on the number of dimensions in which people are deprived. A person with a greater multiplicity of deprivations is given higher priority than someone with only one or two deprivations; setting k establishes the minimum eligibility criteria for poverty in terms of breadth of deprivation and reflects a judgment regarding the maximally acceptable multiplicity of deprivations. The choice of k could therefore be a normative one, with k reflecting the minimum deprivation count required to be considered poor in a specific context under consideration.

There may also be a role for empirical evidence in the setting of k. If studies were to reveal that persons enjoying six functionings tended not to value a seventh, this might suggest setting a cutoff at a k of two or more dimensions rather than using the union approach.

The value of k could also be chosen to reflect specific priorities and policy goals. In this sense, the weights and poverty cutoff allow for a broad range of identification constellations (Nolan and Whelan (1996).Thus, the choice of k can be a useful policy tool. The dimensions and cutoffs in this paper is presented in Table 1.

Table 1 : Dimensions And Deprivation Thresholds.

Safe Drinking Water	Children using water from an unimproved source such as open wells, open springs or surface water.(United Nations, 2003)
Sanitation	Children using unimproved sanitation facilities such as pit latrine without slab, open pit latrine, bucket toilet and hanging toilet.(United Nations, 2003)
Housing	Children living in a house with no flooring (i.e. a mud or dung floor) or inadequate roofing. (United Nations, 2003)
Health	Children who have not been immunized by 2 years of age. A child is deprived if the child has not received eight of the following vaccinations: bcg, dpt1, dpt2, dpt3, polio0, polio1, polio2, polio3,
Health	measles or did not receive treatment for a recent illness involving an acute respiratory infection or diarrhea. .(United Nations, 2003)
Nutrition	Children who are more than two standard deviations below the international reference population for stunting (height for age) or wasting (weight for height) or are underweight (weight for age). The standardization follows the algorithms provided by the WHO Child Growth Reference Study (WHO, 2006)

Source: United Nations (2003).

d. Choice of weights

One challenge with the construction of multidimensional poverty indices is the choice of weights, yet the ordering of wellbeing bundles can be very sensitive to the choice of weights (Decancq and Lugo, 2008). The weights determine the respective value of the different attribute (i.e.) intensity with which a chosen variable contributes to explaining poverty. Therefore, each attribute may be assigned different weights. The main methods of weighting proposed in the literature include equal weights, frequency –based weights, most favorable weights, multivariate statistical weights (e.g. the principal component analysis (Rahman et al., 2003; Ram, 1982; Slottje, 1991), Multiple Correspondence analysis), regression based weights and normative weights (Decancq and Lugo, 2008). None of these methods has been proved the best, and most approaches to poverty measurements do not provide suitable methods to address the weighting issue. Instead, they give the latitude to assign weights to each dimension in a normative way (Batana, 2008). Caution is however advanced on the trade-offs that arise from using different weighting methods and the need for robustness tests to determine the impact of specific

value of weights on poverty indices. (Decancq and Lugo, 2008) the most commonly used approach is the equal weighting. Though convenient, equal weighting is far from uncontroversial (Decancq and Lugo, 2008; Alkire and Foster, 2007.According to Atkinson (2003), equal weights is an arbitrary normative weighting system that is appropriate in some but not in all situations.

ii. *The Multiple Correspondence Analysis (MCA)*

MCA is the application of the simple correspondence analysis (CA) algorithm to multivariate categorical data coded in the form of an indicator matrix or a Burt matrix. It consists of exploring the internal structure of a covariance matrix while producing an additive decreasing disaggregation of the total variance (inertia) of the matrix. MCA was designed to improve on the PCA procedure when the latter loses its parametric estimation optimal properties and to provide more powerful tools for describing the hidden structure in a set of qualitative variables (Asselin, 2009). It is therefore appropriate for the analysis of categorical assets data.

The weights associated to the indicators are determined by a Multiple Components Analysis (MCA) like authors such as Asselin (2002); Ki *et al* (2005) and Foko *et al*, (2007). First, all the variables are returned categorical and the modalities of every categorical variable are transformed in binary indicators taking, 1 if the individual has the considered modality and 0 otherwise. The weights are derived by dividing the factorial scores by the first eigenvalue.

iii. *Logistic Regression*

The logistic model formula is as follows:

$$P = Z = \beta_0 + \beta 1X_1 + \beta_2X_2 + \beta_3X_3 + \ldots\ldots \ldots \beta_\chi K_y \qquad (6)$$

The variable z is the measure of the total contribution of all risk factors used in the model.Here, β_0 is the intercept (constant), and β_1, β_2, β_3 to β_k are the regression coefficients of the predictor variables, X_1, X_2, X_3, and X_k respectively. The computed p value or f (z) is the probability of a particular outcome in the presence of the risk factors with the value range of 0 to 1. If P is a probability then P/ (1-P) gives the corresponding odds (Pallant, 2007; Green & Salkind, 2005; Hosmer & Lemeshow, 2000).

$$Y_i = x_i \beta + \mu_i \qquad (7)$$

Where:

y_i: denotes the dichotomous qualitative variable
x_i: denotes the vector of predictor variables
β: denotes vector of parameters
u_i: denotes the residuals (errors)

The binary variable (poor or non-poor) expression is defined as follows:

$$0 \text{ is } y_i > Z$$
$$1 \text{ is } y_i \leq Z \qquad (8)$$

The estimation is given by:

$$L(y, x\beta) = \prod_{i=1}^{N} \left[\frac{1}{1+(exp\, xi\, \beta)}\right]^{1-yi} \left[\frac{exp\,(-xi\,\beta)}{1+exp\,(xi\,\beta)}\right]^{yi} \qquad (9)$$

The predictor variables are into four categories: Child characteristics-age of child(X_1), sex of child(X_2); Parent characteristics- Mother's educational attainment(X_3), Father's educational attainment(X_4), Father's occupation(X_5); Household characteristics-Gender of household head (X_6), age of household head(X_7), age squared(X_8), wealth index(X_9), household size(X_{10}), household size squared(X_{11}), number of women who had first child at 16 years(X_{12}); Community characteristics – region (X_{13}), ethnicity(X_{14}), presence of health facility (X_{15}).

V. Results and Discussion

a) Child Socio-economic Characteristics

This section presents the socio-economic characteristics of under-5 children in households of rural Nigeria. The characteristics considered are the gender and age in months of the children. The details are presented in the sub-sections below.

i. *Gender*

The table 2 below reveals that both male and female children were evenly distributed among households with 50.4% and 49.6% respectively.

Table 2 : Distribution of Children by Gender.

Gender	Frequency	Percentage (%)
Male	2291	50.4
Female	2252	49.6
Total	**4543**	**100**

ii. *Age*

The table 3 below shows the age categories of rural child in months. The percentage among age categories are closely distributed. Rural children of age category 0-9 had the highest percentage 17.8% with a number of 811 out of the total number of sampled children. This is followed by children of age 40-49 months with a percentage of approximately 17% , with those between 50-59 months of age with the least percentage of 15.4%. Majority of the households, (67.6%) had at least two children of age under-5and about 30% had about 3-5 children below the age of 5 with a mean number of children being 2.The mean age of under 5 children in the household was 29.07 months .

Table 3 : Distribution of Children by Age.

Age of Child (months)	Frequency	Percentage (%)
0-9	811	17.8
10-19	746	16.5
20-29	730	16.3
30-39	770	16.9
40-49	724	17.1
50-59	702	15.4
Total	4543	100

b) Dimensional Weights using MCA

Presented in table 4 are the weights of the indicators for the various dimensions. Any indicator with a negative score reduces welfare and vice-versa.

Table 4 : Dimensions and generated weights of MCA.

Dimension	Indicators	MCA Weights
Safe Drinking water		
	Piped or borehole	0.428
	No piped or borehole	-0.157
	Dug well	0.188
	No dug well	-0.004
	Surface water	0.045
	No surface water	-0.082
	Other sources of water	0.501
	No other sources of water	-0.227
Sanitation		
	Flush Toilet	1.788
	No flush toilet	-0.118
	Pit latrine	0.230
	No pit latrine	-0.216
	Other types of toilet	0.498
	No other types of toilet	-0.020
	No toilet	1.048
	Toilet	-0.058
Housing		
	Modern roof	0.701
	Rudimentary roof	-0.312
	Modern wall	0.591
	Rudimentary wall	-0.690
	Finished floor	0.681
	No finished floor	-0.623
Health		
	Immunized	1.630
	No immunization	-1.469
	Vitamin A supplementation	2.319
	No vitamin A Supplementation	-1.002
Nutrition		
	Stunted	0.368
	Not Stunted	-0.185
	Wasted	0.300
	Not wasted	0.034
	Underweight	0.431
	Not underweight	-0.081

c) Child Poverty Estimates

The multidimensional poverty estimates are based on five dimensions: Safe drinking water, Sanitation, Housing, Health and Nutrition. Estimation on child deprivation in these dimensions with different weights assigned as generated by the MCA were conducted. The number of dimensions in which a child must be deprived, a second cut off k, was set below which a child is considered poor.

Table 5 presents the estimated poverty index based on the value of the cut - off, k. It can be observed from the table that the poverty measures decreases with the level of k. This agrees with the findings of Batana, (2008). With the number of deprivations experienced by the children K equals 1, the head count ratio H is 90.9% compared to 36.6% for k=3.This is similar to head count ratio of Bangladesh that showed 96% of the children multidimensional poor for K=1 (Gordon et al, 2003). The adjusted headcount ratio also suggests that 52% and 27.9% for k=1 and k=3 respectively; of the children are poor. A similar result was reported for children in Bangladesh in which 48.7% and 40% of children are multidimensional poor for k =1 and k= 3 respectively (Alkire, S. and Roche, J. (2011). Kabubo- Mariara et al., (2010) also found a slightly different results for rural children in Kenya in which 27.2% and 5.9% for k=1 and k=3 respectively. The intensity of poverty shows that the share of dimensions in which the poor are deprived increases with k. Although, the multidimensional child poverty index is decreasing, it is because the number of children that are poor is reducing but the intensity of poverty among the poor is increasing. This agrees with the findings of Alkire et al, (2011) where they posited that in Lesotho, Kenya and Nigeria, reduction in MPI is achieved by reduction in headcount and barely by reduction in intensity of poverty. The average deprivation among the poor who experience at least a dimension is 2.86 dimensions and among children who experience at least 3 dimensions (k=3) it is 3.81. This is consistent with the findings of Alkire, S. and Roche, J. (2011) in which the average deprivation among children was 3.03 for k=1 and 3.67 for k=3.

Table 5 : Multidimensional Poverty indices.

(k)	(M_0=HA)	(H)	(A)	Average deprivation
1	0.521	0.909	0.573	2.86
2	0.483	0.766	0.631	3.16
3	0.279	0.366	0.762	3.81
4	0.088	0.094	0.936	4.68
5	0.047	0.047	1.00	5.00

i. *Contribution of Dimension to MPI*

The relative contribution of the various dimensions to overall multidimensional poverty is shown in table 6. The results suggest that the highest contribution is from health dimension with 38.5% at K=1. This is followed by the sanitation dimension with 22.5% at k= 1 while nutrition contributed least with 8.63%. Similar result is reported at k=3. This finding implies that sanitation and health of children should be a policy target to reduce child poverty.

Table 6 : Relative contribution of Dimensions to MPI.

Dimensions	Safe Drinking Water(%)	Sanitation(%)	Housing (%)	Health (%)	Nutrition(%)
K=1	18.40	22.58	11.85	38.54	8.63
K=2	16.66	20.71	12.33	41.14	9.16
K=3	16.10	17.36	15.31	38.17	13.06
K=4	12.01	14.25	9.64	32.05	32.05
K=5	13.34	13.34	13.34	29.99	29.99

ii. *Decomposition of multidimensional poverty indices by region*

The results in table 7 show that south west contributes the highest to multidimensional poverty indices (25.6%) followed by North West (19. 2%) at k=1. Kabubo, M. *et al* 2010 opined that it is however difficult to order regions at all possible cut-offs, the disparity between the rankings by indices and contribution is due to the relative differences in the region's population shares. The southern regions however contributed the highest to the overall MPI with 56.1% as against the northern regions with 44%. This is consistent with the National report by UNICEF(2008) on

Nigeria which reported that intriguingly, poverty among households with children in the southern geopolitical zones (54.4 %) was much higher than in the North with 55.2%.

Table 7 : Decomposition of Multidimensional poverty indices by region.

Poverty cutoff	K=1			K=3		
Region	M_0	H	A	M_0	H	A
North Central	0.130	0.128	1.02	0.121	0.121	1
North east	0.118	0.105	1.12	0.137	0.131	1.05
North West	0.192	0.163	1.18	0.257	0.251	1.02
South east	0.145	0.159	0. 91	0.127	0.132	0. 96
South west	0.256	0.275	0. 93	0.252	0.261	0. 97
South South	0.160	0.170	0. 94	0.146	0.149	0. 98

iii. *Decomposition of multidimensional poverty indices by gender*

The decomposition of poverty by gender of child for all possible poverty cut-offs shows that males contributed more to the overall multidimensional poverty than female, though the difference is marginal. The gender differentials are presented in table 8. The percentage of male and female children that are poor at k=1 is 52.6% for male and 51.7% for female while it is 28.4% for male and 27.3% for female at k=3,. This is consistent with the findings on child poverty in kenya by Kabubo - Mariara et al 2010 .However, the intensity of poverty is lower for male children than female.

Table 8 : Decomposition of Multidimensional poverty indices by Gender.

Poverty cutoff	K=1			K=3		
Gender	M_0	H	A	M_0	H	A
Male	0.526	0.918	0.57	0.284	0.375	0.76
Female	0.517	0.899	0.58	0.273	0.357	0.78

d) Determinants of Child Poverty

Table 9 shows the logistic regression estimates of determinants of child poverty. The MPI obtained for poverty cutoff (k) equals one (0.521) was taken as the poverty line to classify households into poor and non-poor. The diagnostic statistics from the logistic regression model shows that the log likelihood ratio χ^2 (1411.67) is significant at 1% level.

i. *Effect of Child Characteristics on Poverty*

The coefficients for different age categories of the child are significant and were statistically different from zero at 1%. The variables however are negatively

correlated with the probability of a child being poor. This shows that as a child's age increases (0-9 months to next age category), the probability of the child being poor decreases. The estimated marginal effect shows that the likelihood of a child within the age of 30-39 months being multidimensional poor is reduced by 0.19 percentage points.

ii. *Effect of Parent Characteristics on Poverty*

Households with women having secondary education have a negative coefficient and significant at 5%. The negative coefficient implies that the probability of a child being poor decreases with the level of education of the mother. A mother with a higher class of education reduces the likelihood of being multidimensional poor by 0.03 percentage points.

Also, a father with secondary education (significant at 5%) lowers the probability of a child being poor. A father with a secondary education has a higher marginal impact of reducing the likelihood of being multidimensional poor by 0.05 percentage points. This shows that child poverty decreases with the level of education of the parents as also reported by Apata et al (2010) in a study carried out in rural South-west Nigeria. This agrees with the findings of Bastos et al, (2009) that education increases the stock of human capital, which in turn increases labour productivity and wages. Since labour is by far the most important asset of the poor, increasing the education of the poor will tend to reduce vicious cycle of poverty. Also, Palmer-Jones and Sen (2003) found that in rural India, households where the primary wage-earner has received no formal education or only had up to primary level, they are more likely to be poor than households whose earning members have attended secondary school and beyond.

With respect to the occupation of household heads, the probability of a child being poor decreases with parents engaged in skilled, service jobs and other un-skilled occupation as shown by the negative correlation rather than in agriculture which has a positive relationship with the probability of the child being multidimensional poor. This is similar to the findings of Anyawu, (2010) in Nigeria that type of occupation has a high correlation with poverty. For household heads that are agriculture-employees, likelihood of child being multidimensional poor increases by 0.02 percentage points while those engaged in service job further reduces the impact of the child being multidimensional poor by 0.04 percentage points. It can be said that the occupation of the household head represents an important resource for the well-being of household members. This is further supported by Southgate, (2007) that asserted that the impact of the household head being primarily involved in agriculture is linked to the notion that poverty rates, hunger, and malnutrition are higher in the rural areas and among folks that depend primarily on agriculture for their livelihoods.

iii. *Effect of Household characteristics on Poverty*

The probability of a child being poor is lower when the household head is a male rather being a female. A female headed household had a positive correlation with the likelihood of being multidimensional poor and significant at 1%. Similar to this finding is the study carried out in rural south-west Nigeria by Apata, et al (2010) that female headed households had a higher probability of staying below the poverty line as further supported by World Bank, (1999) which reported that female headed household has been identified as the poorer group.

The estimated marginal effect shows that a child living in a female headed household increases the likelihood of being multidimensional poor by 0.03 percentage points as compared to the male category. The probability of a child being multidimensional poor increases with the age of household head which is significant at 10%. This is consistent with *apriori* expectation that poverty increases with old age as the productivity of the individual decreases. This position is consistent with those of Gang *et al*. (2002), Datt and Jolliffe (1999), and Rodriguez (2002).

The household size and household size squared coefficients had positive correlation with the probability of a child being poor and significant at 5%. Thus child poverty increases with increasing size of the household. The estimated marginal impact of the likelihood of child being multidimensional poor in a large household (11-20) increases by 0.04 percentage points. This position is consistent with Maxwell, (1996) and Maxwell et al, (1999) who opined that there is a family size paradox of poverty which Lipton, (1999) maintained that small households are less likely to be poor than others and are likely to be poor than others. Okunmadewa, (2002) and Gang *et al*, (2002) further explained that such is especially found in agrarian households.

In relation to the wealth quintile index, all categories other than 'poor' and the 'poorer' categories had a negative correlation with the probability of a child being poor. This implies that the probability of a child living below poverty line increases with households within the 'poor' and 'poorer' wealth index category. The marginal effect of children from rich households has a reduced effect on the likelihood of being multidimensional poor by 0.15 percentage points.

iv. *Effect of Community Characteristics on Poverty*

The probability of a child living below poverty line increases with the child being in the north-west region of the country and statistically significant at 5%. South west had a negative coefficient and significant at 5%. This implies that the probability of child being poor decreases from the north to the south as shown by the coefficients of other regions. A high marginal impact was observed on the probability of a child being

multidimensional poor from a geographical location. The marginal impact is highest in North West with a marginal impact of increasing the probability of being poor by 0.2 percentage points.

The presence of a health facility also reduces the probability of a child being poor as shown by the negative correlation which is significant at 5%. The impact of the presence of a health facility in the community reduces the probability of being multidimensional poor by 0.02 percentage points as shown in last column of table 9.

Table 9 : Logistic Regression estimates of determinants of child poverty.

Variables	Coefficients	Marginal Effects
Child Characteristics		
Age in months		
10-19	-0.3824***	-0.0887***
	(0.1292)	(0.0308)
20-29	-0.5684***	-0.1336***
	(0.1287)	(0.0312)
30-39	-0.8358***	-0.1986***
	(0.1264)	(0.0307)
40-49	-0.7028***	-0.1661***
	(0.1260)	(0.0307)
50-59	-0.7832***	-0.1155
	(0.1294)	(0.0234)
Sex of child		
Female	-0.0278	-0.1731
	(0.0728)	(0.0279)
Mothers education		
Primary or less	-0.5071	-0.0245
	(0.1019)	(0.0201)
Secondary	-0.7425**	-0.0106***
	(0.1177)	(0.0670)
Higher	-0.7096**	-0.0255**
	(0.2312)	(0.0334)
Fathers education		
Secondary education	-0.1108**	-0 .0479**
	(0.0920)	(0 .0300)
Higher education	0.5266	0.0588
	(0.6080)	(0.0149)
Occupation		
Agriculture employee	0.2145**	0.0169*
	(0.1353)	(0.0348)
Services	-0.1124***	-0.0460***
	(0.1456)	(0.0091)
Skilled& Unskilled	-0.1846***	-0.0422***
	(0.1516)	(0 .0353)

Household characteristics		
Sex of household head		
Female	0.3264***	0 .0347***
	(0.1166)	(0 .0305)
Age of Household head		
48-77	0.3437*	0.2358***
	(0.7377)	(0 .0322)
More than 77 years	0.3967	-0.4568
	(0.1242)	(0.0281)
Age Squared	-1.0088**	-0.5942
	(0.1383)	(0.023)
Wealth Quintile		
Poorer	1.9874***	0.0280**
	(0.1393)	(0.0194)
Middle	-2.7611***	-0.0302**
	(0.1533)	(0.0308)
Richer	-3.4010***	-0.0166 ***
	(0.2068)	(0.0563)
Richest	-1.88	-0.1499
	(0 .1773)	(0.1331)
Women who had child before 16years		
Yes	0.6344**	0.1321
	(0 .5331)	(0.0390)
Household Size		
11-20	0 .7684***	0.0448***
	(0.8164)	(0.0345)
21-30	0.2688**	0.0487***
	(0.1593)	(0.0411)
Household size squared	0.2677**	0 .0114***
	(0.1537)	(0.0067)
Community Characteristics		
Region		
North East	0.55784	0.1148
	(0.1589)	(0.0290)
North West	0.6207**	0 .2033
	(0 .2867)	(0 .1375)
South East	-0 .5741***	0 .0226
	(0 .2705)	(0 .0255)
South West	-0.5353**	-0.0592
	(0.1425)	(0.0588)
South-South	-0 .4984**	0 .0188**
	(0.2385)	(0.0078)
Ethnicity		
Igbo	-0.1641***	-0.1189**
	(0.2103)	(0.0272)
Yoruba	-0.2627**	-0.1078**
	(0.1808)	(0.0267)
Others	-0.2086*	-0.0206*
	(0.1345)	(0 .0111)

Health Facility		
Yes	-0.3811** (0.1448)	-0.0150** (0 .0053)
Constant	3.421 (0.3075)	

Number of observations	= 4539
LR chi2(38)	= 1411.67
Log likelihood	= -2313.286
Pseudo R^2	= 0.2338

**Standard error in brackets; *** P< 0.01 **P<0.05 *P<0.1*

VI. Conclusion and Recommendation

The paper assessed the incidence,intensity and the determinants of child poverty in rural Nigeria using the Alkire - Foster multidimensional child poverty measurement. It was found that the estimated Alkire and Foster indices depend on the number of dimensions considered and that the poverty measure decreases with the number of dimension cutoffs or the sum of weights (K). The results show that the highest contribution to multidimensional poverty in rural Nigeria is from the health dimension followed by sanitation, safe drinking water, housing and the leastcontribution is from nutrition. The multidimensional child poverty index of 0.526 with minimal variations in the relative contribution of gender to overall multidimensional poverty index. In general however, efforts to combat child poverty should be directed to both male and female child in order to achieve the major goal of reducing poverty in general.

The determinants of child poverty show that age of child, parent's education, employment in the service sector, male-headed households, 'rich' households and presence of a health facility reduces the probability of a child being multidimensional poor . On the other hand, large household size, female-headed households, age of the household head and households engaged in agriculture increases the probability of a child being multidimensional poor.

Eradicating childhood poverty specifically should be considered from several dimensions as child poverty is a multidimensional phenomenon. The multidimensional child poverty index of 0.526 is too high as compared with the MPI of other sub-saharan countries. These include encouraging higher education for parents, provision of more health and sanitation infrastructure, promotion of family planning to reduce household size and improvement in agricultural productivity and incomes.

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