
# determinants of multidimensional poverty transitions among rural households in Nigeria

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***Abstract:***

*Despite recent progress in poverty reduction globally, millions of people are either near or living in severe multidimensional poverty in Nigeria. This study examined multidimensional poverty transitions in rural Nigeria, employing the Alkire and Foster Measure of Multidimensional Poverty, Markov Model of Poverty Transitions and the Multinomial Logistic Regression Model for analysis. Results showed that multidimensional poverty among rural households in Nigeria is mainly chronic (46.5%) while education and assets dimensions contributed most to the incidence and severity of multidimensional poverty among the households. Educational status, household size, number of assets owned, ownership of land influenced transient poverty while marital status, household size, land ownership and number of assets owned influenced chronic poverty. The study recommends the enactment and implementation of relevant laws against marginalization of rural women in ownership of assets and intensification of efforts and incentives aimed at encouraging human capital development in the rural areas*

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# DETERMINANTS OF MULTIDIMENSIONAL POVERTY TRANSITIONS AMONG RURAL HOUSEHOLDS IN NIGERIA

**ABSTRACT**

Despite recent progress in poverty reduction globally, millions of people are either near or living in severe multidimensional poverty in Nigeria. This study examined multidimensional poverty transitions in rural Nigeria, employing the Alkire and Foster Measure of Multidimensional Poverty, Markov Model of Poverty Transitions and the Multinomial Logistic Regression Model for analysis. Results showed that multidimensional poverty among rural households in Nigeria is mainly chronic (46.5%) while education and assets dimensions contributed most to the incidence and severity of multidimensional poverty among the households. Educational status, household size, number of assets owned, ownership of land influenced transient poverty while marital status, household size, land ownership and number of assets owned influenced chronic poverty. The study recommends the enactment and implementation of relevant laws against marginalization of rural women in ownership of assets and intensification of efforts and incentives aimed at encouraging human capital development in the rural areas.

**Keywords: Multidimensional Poverty, Transitions, Rural households, Nigeria**

## 1. INTRODUCTION

In its multidimensional nature, poverty is the source of all human and social ills capable of constraining the creative ability of man, making him think of just mere existence (Chukwuma, 2013). The poor experience a sense of voicelessness, powerlessness, exposure to ill treatment, gross inability to influence key decisions affecting their lives as well as inadequate social networking within the institutions of state and society (World Bank, 2001). Some of these broader aspects of poverty are captured in the concept of multidimensional poverty which concentrates on deprivations in the living standard of a population in terms of functioning failures of different quality of life attributes such as per capita real GDP, life expectancy at birth and educational attainment (Chakravarty, 2006).

In 104 developing countries, 1.2 billion people had an income of $1.25 or less a day but the multidimensional poverty headcount for 91 developing countries was an estimated 1.5 billion people—as measured by the Multidimensional Poverty Index (MPI). This is owing to the fact that the MPI measures not only the proportion of people deprived but also the intensity of deprivation for each poor household. Based on these intensity thresholds, people are then classified as near multidimensionally poor, multidimensionally poor or in severe poverty, respectively (UNDP, 2014).

According to the Multiple Indicator Cluster Survey (MICS) carried out in 2011, 18.2% and 31.4% of Nigerians live near multidimensional poverty and in severe poverty respectively. However, in 2014, the Oxford Poverty and Human Development Initiative (OPHI) observed that 19.3% of Nigerians remained vulnerable to poverty while 25.3% live in severe poverty. While there is an obvious decline in those living in severe multidimensional poverty, there is an apparent increase in those living near or vulnerable to multidimensional poverty suggesting that the major issue is not that households are multidimensionally poor but the probability that a household if currently multidimensionally poor will remain in that state or move out of it. This introduces dynamics to multidimensional poverty assessment.

Dynamics research presents a dramatically more comprehensive understanding of poverty than point-in-time studies (Valletta, 2006; Dahl, Flotten and Lorentzen, 2008). While point-in-time studies provide a static 'snap shot' of the population at a given single moment providing no information on the total number of years that given individuals are poor, nor the total number of poverty incidences they experience (Gottschalk, McLanahan and Sandefur, 1994), dynamics or longitudinal research traces the same individuals or households over time and so is able to record stories of change. It also helps explain the fluidity of movement in and out of poverty and the complexity of policy solutions required for an inclusive social protection mechanism.

This is especially needed in rural communities where multidimensional poverty is most prominent. According to OPHI (2014), about 85% of the world's multidimensionally poor live in rural areas. The percentage of rural households living in multidimensional poverty is even more in Africa. For instance, in Somalia, it affects 60% of the population in urban households and over 95% of the population in rural households. In Burkina Faso, 43% and 94%, in Niger 56% and 96% and in Ethiopia 54% and 96% of urban and rural households respectively (NBS, 2005). In Nigeria, the severity of poverty has also been found to be more pronounced in the rural areas (IFAD, 2012; Oyekale and Oyekale 2013). According to the NBS Poverty Profile Report 2010, the rural dwellers constitute 50.2% of the population with a poverty rate of 66.1%. The reason for this is that poverty is associated with; agricultural production, high vulnerability to health hazards, low level of

education, lack of access to capital, gender issues, high fertility rate, and poorly developed social infrastructure, the same features that characterize the rural areas (Oyekale *et al.,* 2010).

Successive governments have adopted various poverty alleviation strategies such as National Fadama Development Project I, II and III, Community Social Development Projects, Seven Point Agenda and Vision 20-2020. Sadly, their level of social impact leaves much to be desired as they have failed to achieve the objectives for which they were established (Ovwasa, 2000; Adesopo, 2008; Omotola, 2008). The failure of these measures has been ascribed to political and policy instability, lack of mechanisms for the sustainability of the programs and lack of effective targeting mechanisms for the poor (Obadan, 2001; Garba, 2006).

Targeting mechanisms become effective in poverty alleviation efforts if poverty is treated as being multidimensional and if they emanate from a dynamic analysis of poverty with a view to ascertaining the factors influencing transitions into and out poverty, distinguishing between the chronically and the transitorily poor, identifying those vulnerable to poverty and those non-poor at high risk of falling into poverty in the future if preventive steps are not taken (Maggio, 2004, Thorbecke, 2005; Kay, 2006; Diniz, 2008; Justino *et al.,* 2008). This understanding among researchers interested in the well being of households (urban and rural) over time has resulted in a number of empirical studies on multidimensional poverty both home and abroad (Sen, 1999; Gass and Adetunmbi, 2000; Oyeyomi, 2003; Alkire and Foster, 2007; Oyekale *et al.*, 2010, Ifelunini *et al*., 2013, Adeoti, 2014).

While these studies have examined the trend, determinants, incidence and spatial dimension of multidimensional poverty, there have been very few studies on the dynamics of multidimensional poverty most especially in sub-Saharan Africa where 29% of the multidimensionally poor reside (OPHI, 2014). In fact, to the best of our knowledge, there has been no study on multidimensional poverty transitions of rural households in Nigeria. Apart from contributing to scarce literature on multidimensional poverty transitions in Nigeria, this study will also allow for the identification of the dimensions in which multiple deprivations have been reduced the most over time. This would lead to better understanding of what policies worked and what practical applications need to be modified. Identifying those who remain multidimensionally poor and those who are likely to become multidimensionally poor will go a long way in assisting concerned stakeholders in formulating strategies not only to reduce the present menace of multidimensional poverty in Nigeria but also prevent possible increase in the number of the multidimensionally poor.

## 2. REVIEW OF EMPIRICAL STUDIES ON MULTIDIMENSIONAL POVERTY TRANSITIONS

Due to the recent conceptualisation of poverty as being multidimensional, researchers are beginning to examine multidimensional poverty dynamics. Using four rounds of Indonesia Family Life Survey (IFLS) data for the period 1993, 1997, 2000 and 2007, Wardhana (2010) examined Multidimensional Poverty Dynamics in Indonesia between 1993 and 2007. Over the 1993-2007 period, multidimensional poverty measured by the adjusted head count ratio decreased while the number of multidimensionally poor people fell from 32 to 8% even though their average intensity has remained more or less equal (around 40%). Panel results indicated that around 8% of Indonesians were chronically and multidimensionally poor, with an average duration of 80% of periods. Housing and assets were found to be the indicators contributing most to the chronic and multidimensional status of the population.

Acar (2014), using panel data drawn from the Survey of Income and Living Conditions (SILC) in the years 2007-2010, studied the dynamics of multidimensional poverty in Turkey with the aim of identifying the "poor" in Turkey by proposing a multidimensional poverty measure that incorporates various dimensions closely related to the well-being of individuals (such as labor market, housing, health and living standards), and to investigate how the new measure differs from other existing poverty measures by using random effect probit model. Findings showed that the new measure is partially consistent with the other measures and multidimensional poverty decreased during the period under examination. Higher years of schooling, home ownership or being a rental/asset income recipient were found to decrease the probability of being multidimensionally poor, while large household size, attachment to agricultural employment or being a social welfare income recipient increased the probability of being multidimensionally poor.

From the review of literature above, it is evident that there is a dearth of empirical studies on multidimensional poverty transitions, a gap this study attempts to fill.

## 3. MATERIALS AND METHOD

### Scope of Study

The scope of the study is rural Nigeria representing 49.7% of the country's population (World Bank, 2011). Nigeria is the most populous country in Africa (LOC, 2008).The country has 36 states plus the Federal Capital Territory (FCT) - Abuja. The climate of the country generally falls within the humid tropics and the country is located close to the equator. High humidity is experienced from February to November in the South and from June to September in the North. Low humidity coincides with the dry season. Annual rainfall decreases Northward; rainfall ranges from about 2000 millimeters in the coastal zone to 500-700 millimeters in

the North (LOC, 2008). The presence of multiple vegetation zones, abundant rain, surface water and underground water resources and moderate climatic extremes, allow for production of diverse food and cash crops by over 60% of the population making the agricultural sector to be the chief employer of the country's total labour force, providing livelihood for about 90 percent of the rural population (IFAD, 2012).

**Type and Sources of Data**

The secondary data used in this study is the General Household Survey-Panel collected by National Bureau of Statistics in conjunction with the Federal Ministry of Agriculture and Rural Development (FMA&RD), the National Food Reserve Agency (NFRA), the Bill and Melinda Gates Foundation (BMGF) and the World Bank (WB). Both urban and rural enumeration areas (EAs) were canvassed. However, this study utilized the rural EAs only.

The first wave of the GHS-Panel was carried out in two visits to the panel households (post-planting visit in August-October 2010 and post-harvest visit in February-April 2011). The second wave of the GHS-Panel was also carried out in two visits (post-planting visit in September – November 2012 and post-harvest visit in February-April 2013). Information was obtained from the same set of households in wave one to track households that moved between wave one and wave two and households that moved during wave two, that is between the post planting visit and the post-harvest visit. There was some attrition of households between the post-planting and post-harvest visits and consequently between the two waves. This was due to the inability to relocate the households who were not at home or moved away. Thus the number of people varied between the two waves.

**Sampling Procedure and Sample Size**

Households were selected for the GHS panel using the two-stage probability sampling procedure. In the first stage, Primary Sampling Units (PSUs) also known as Enumeration Areas (EAs) were chosen. These were selected based on probability proportionate to size (PPS) of the total EAs in each state and Federal Capital Territory (FCT), Abuja and the total households listed in those EAs. A total of 500 EAs were selected using this method. The second stage involved the selection of households employing the systematic selection of ten (10) households per EA. In all, 500 clusters/EAs were canvassed and 5,000 households were interviewed (3,370 rural households and 1,630 urban households). However, only 2,746 rural households with complete and relevant data in wave 1 and 2 constituted the sample size for this study.

**Method of Data Analysis**

The analytical techniques used in this study include Descriptive statistics, Alkire and Foster Multidimensional Poverty Measures, Markov Model of Poverty Transitions and Multinomial Logistic Regression. Descriptive statistics such as mean, frequency distribution and percentages were used to describe the socio-economic characteristics of the rural households while the Alkire and Foster measure of poverty was applied to examine the multidimensional poverty status of households in rural Nigeria and the relative contributions of dimensions to multidimensional poverty.

Five dimensions were chosen based on literature (Alkire and Foster, 2009, Alkire and Santos, 2010); some enduring consensus, particularly surrounding human rights, the Millennium Development Goals (MDGs), psychological accounts of basic needs, universal values and data availability. The dimensions are; Housing, Sanitation, Education, Health and Assets. For simplicity, the dimensions were equally weighted. That is, each dimension carried a weight of 1 and as such the weights of the dimensions sums up to 5. The equal weighting between the dimensions follows the HDI convention, upon which a critical literature has developed (e.g, Chowdhury and Squire, 2006).

**Table 1: Dimensions, Indicators, Deprivation cut-offs and weights of MPI**

| **Dimension (Weight)** | **Indicator (Weight)** | **Deprivation cut-off** |
|---|---|---|
| Housing (1/5) | Floor Material (1/25)<br>Wall Material (1/25)<br>Roof Material (1/25)<br>Cooking Fuel (1/25)<br>Lighting Fuel (1/25) | Households live in a house with mud floor, mud wall or inadequate roofing material (grass) [United Nations, 2003]. Households using firewood and coal as main source of cooking fuel and those without electricity and other improved sources as main lighting material. |
| Sanitation (1/5) | Toilet type (1/10)<br>Source of Drinking Water (1/10) | Households using unimproved toilet facilities such as uncovered pit latrine, bucket toilet and hang toilet (United Nations, 2003). Households using water from an unimproved source like open wells, open springs and surface water (United Nations, 2003). |
| Education (1/5) | Ever attended school (1/10)<br>Household head having at least primary education (1/10) | Household head that have never attended school and households without household head having at least 6 years of formal education (United Nations, 2003). |
| | | Household heads that suffer from any form of illness and |

| | | |
|---|---|---|
| Health (1/5)<br><br>Assets (1/5) | Suffer any form of illness (1/10)<br>Activities stopped due to illness (1/10)<br>Asset Ownership (1/10)<br>Land Ownership (1/10) | stopped activities as a result of such illness.<br><br>Household own only one of the following assets: bicycle, radio, house, television, telephone and does not own agricultural land |

Source: Normative choice by author with reference to the data available, UNDP (2010) and Alkire and Santos (2014).

The change in poverty over two time periods (waves) composed of four different seasons in this study can be due to the effect of changes in the incidence of poverty or intensity of poverty or the interaction between the two (Alkire *et al.*, 2011). Following Adeoti (2014), this change was assessed by considering either the absolute change across the two time periods or the percentage change in poverty. The absolute change is the difference in the level of any focal indicator across two time periods while the percentage change in poverty expresses the change relative to the initial poverty level. For two time periods $t_x$ and $t_y$ where $t_x < t_y$ and w is a vector of the relative weights of the indicators; these changes are estimated as;

Annual Absolute Change in Poverty ($M_o$): $\Delta M_o(X,Y;z,k,w) = \dfrac{[M_o(Y;z,k,w) - M_o(X;z,k,w)}{t_y - t_x}$

Annual Percentage Change in Poverty ($M_o$):

$$\Delta M_o(X,Y;z,k,w) = 100 \times \frac{[M_o(Y;z,k,w) - M_o(X;z,k,w)]}{t_y - t_x \, M_o(X;z,k,w)}$$

Movement of households into and out of multidimensional poverty during the two waves was examined using the spells approach of poverty decomposition and the Markov model employed by Bhatta and Sharma (2006), Barrientos and Mase (2012), Adepoju (2012) and Finn and Leibbrandt (2013). A household that

is multidimensionally poor in only one period (wave) is said to be experiencing transient multidimensional poverty while a household that is poor in both periods is considered to be chronically poor.

The multinomial logit (MNL) model [(following Cunguara, 2008] was used to analyze the factors influencing the shifts in multidimensional poverty status between the two waves (wave 1 and 2).

The MNL model is explicitly expressed as;

$$Y_1 = \propto_1 + B_{11}X_1 + B_{21}X_2 + \ldots\ldots\ldots\ldots B_nX_n + \epsilon_i$$

$$Y_2 = \propto_2 + B_{12}X_1 + B_{22}X_2 + \ldots\ldots\ldots\ldots B_nX_n + \epsilon_i$$

$$Y_3 = \propto_3 + B_{13}X_1 + B_{23}X_2 + \ldots\ldots\ldots\ldots B_nX_n + \epsilon_i$$

$$Y_o = \propto_o + B_{10}X_1 + B_{20}X_2 + \ldots\ldots\ldots\ldots B_nX_n + \epsilon_i$$

Where $Y_i$ represents 4 unordered categories of multidimensional poverty transition:

$Y_1$ = those who were multidimensionally poor in both periods (i.e. chronically poor).

$Y_2$ = those who were multidimensionally poor in the first period, but not in the second period (i.e. transitory poor).

$Y_3$ = those who were non-poor in the first period, but multidimensionally poor in the second period (i.e. transitory poor).

$Y_0$ = those who were non-poor in both periods (i.e. always non-poor).

$X_1$ - - $X_n$ represent vector of the explanatory variables.

$B_1$ - - $B_n$ represent the parameter coefficients.

$\epsilon_i$ = represents the independently distributed error terms.

$\propto 0 - \propto 3$ shows the intercept or constant terms.

Specifically, the independent variables used in the model are as follows;

$X_1$= Sex (male = 1, 0 if otherwise)

$X_2$= Age (in years)

$X_3$ = Marital Status (Never Married = 1, 0 if otherwise)

$X_4$ = Marital Status (Separated/Divorced = 1, 0 if otherwise)

$X_5$ = Marital Status (Widowed = 1, 0 if otherwise)

$X_6$= Household Size (number)

$X_7$ = Toilet type (pit laterine = 1, 0 if otherwise)

$X_8$ = Access to Credit (yes = 1, 0 if otherwise)

$X_9$ = Household Head has primary education (yes = 1, 0 if otherwise)

$X_{10}$ = Household Head has secondary education (yes = 1, 0 if otherwise)

$X_{11}$ = Household Head has tertiary education (yes = 1, 0 if otherwise)

$X_{12}$ = Assets (number)

$X_{13}$ = Monthly Expenditure (Naira)

$X_{14}$ = House Ownership (Owned = 1, 0 if otherwise)

$X_{15}$ = Land Ownership (Owned = 1, 0 if otherwise)

$X_{16}$ = Distance to Health Centre (Minutes)

$X_{17}$ = Membership in Cooperative (yes = 1, 0 if otherwise)

$X_{18}$ = Access to Remittances (yes = 1, 0 if otherwise)

$X_{19}$ = Wall Material (Mud = 1, 0 if otherwise)

$X_{20}$ = Roof Material (Grass = 1, 0 if otherwise)

$X_{21}$ = Floor Material (Mud = 1, 0 if otherwise)

$\mu$ = Error term

## 4. RESULTS AND DISCUSSION

Table 2 presents some selected socio-economic characteristics of the respondents. The mean age of respondents was 49.7 years while almost all the respondents have one form of formal education or the other but with majority having primary education. This could be attributed to the fact that most rural dwellers seem not to consider secondary and post secondary education as being vitally important for life sustenance. Also, more than four-fifths of the sampled household heads were married having a mean household size of approximately 6 members per household with the majority residing in the North Western zone of Nigeria. The average monthly expenditure of the respondents stood at ₦29,451.

**Table 2: Selected Socio-economic Characteristics of Respondents**

| Variables | Frequency | Percentage |
|---|---|---|
| **Age (in years)** | | |
| ≤ 30 | 288 | 10.5 |

| | | |
|---|---|---|
| 31 – 60 | 1841 | 67.0 |
| 61 – 90 | 606 | 22.1 |
| > 90 | 11 | 0.4 |
| **Total** | **2746** | **100.0** |
| Mean | 49.7 | |
| SD | 15.1 | |
| **Marital Status** | | |
| Never Married | 66 | 2.4 |
| Married | 2244 | 81.8 |
| Separated/Divorced | 76 | 2.7 |
| Widowed | 360 | 13.1 |
| **Total** | **2746** | **100.0** |
| **Household Size** | | |
| 1 – 5 | 1260 | 45.9 |
| 6 – 10 | 1221 | 44.5 |
| 11 – 15 | 247 | 9.0 |
| > 15 | 18 | 0.6 |
| **Total** | **2746** | **100.0** |
| Mean | 6.1 | |
| SD | 3.1 | |
| **Educational Status** | | |
| No Formal Education | 208 | 7.6 |
| Primary | 2280 | 83.0 |
| Secondary | 19 | 0.7 |
| Tertiary | 239 | 8.7 |
| **Total** | **2746** | **100.0** |
| **Geopolitical Zone** | | |
| North Central | 521 | 19.0 |
| North East | 434 | 15.8 |
| North West | 621 | 22.6 |

| | | |
|---|---|---|
| South East | 512 | 18.6 |
| South South | 468 | 17.0 |
| South West | 190 | 6.9 |
| **Total** | **2746** | **100.0** |
| **Monthly Expenditure** | | |
| ≤ 40000 | 2219 | 80.8 |
| 40001 – 80000 | 468 | 17.0 |
| 80001 – 120000 | 48 | 1.7 |
| > 120000 | 11 | 0.5 |
| **Total** | **2746** | **100.0** |
| Mean | ₦29451 | |
| SD | ₦18655 | |

**Multidimensional Poverty Status of Rural Households**

Table 3 presents the estimated multidimensional poverty indices (headcount of poverty, adjusted head count of poverty, adjusted poverty gap and the adjusted poverty severity measure) based on different cut-offs, *k*. As shown in Table 1, the multidimensional poverty estimates were derived using five dimensions; Sanitation, Housing, Health, Education and Assets with equal weights assigned to all. For each dimension, thresholds were set which is the first cut-off to identify if the household is deprived in that dimension. A second cut-off, *k* was set which states the number of dimensions in which a household can be deprived to be considered MPI poor. It can be observed from Table 4.3 that in both waves, the headcount (H) and the adjusted headcount ratio ($M_0$) decreased with increase in *k*. This is in accordance with *a priori* expectations that the number of multidimensionally poor households reduces as the number of dimensions used increases and is consistent with the findings of Batana (2008) and Adeoti (2014).

With the number of deprivations experienced by the households at *k* equals 1, the poverty head count ratio stood at 92% in wave 1 and about 95% in wave 2 indicating that only a few of the panel households were not deprived in at least one dimension. At $k = 3$, the mid-point of the considered dimensions, all indices of poverty increased from wave 1 to wave 2. While the poverty head count increased from 34.6% to 43.1%, the intensity of poverty increased from 73.4% to 74.2%. These changes in the percentage of people who are poor (H) and the share of deprivations in which the poor are deprived (A) accounted for the increase in the

multidimensional poverty index ($M_0$) from 0.254 to 0.320. However, an increase in *k* decreased $M_0$. This is because the percentage of households estimated poor is reducing while the intensity of poverty among the poor is increasing. These values are comparatively lower to those estimated by Adeoti (2014) in which the MPI increased from 0.427 to 0.553 in 2010 relative to 2004.

The adjusted poverty gap ($M_1$) values at different cut-offs *k* indicates how far the poor are from the poverty line and what it will take to move the poor out of poverty. However, for a multidimensional poverty measure, the poverty line is not clearly defined. Hence, this measure is subjective but indicates that a high adjusted poverty gap implies the farther away the poor are from the poverty line. The adjusted poverty severity ($M_2$) for households in rural Nigeria is also subjective but points out that the larger the value of $M_2$, the harder it is to eliminate poverty.

**Table 3: Household Multidimensional Poverty Indices**

| ***K*** | **Wave 1** | | | | | **Wave 2** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **$M_0$** | **$H_o$** | **A** | **$M_1$** | **$M_2$** | **$M_0$** | **$H_o$** | **A** | **$M_1$** | **$M_2$** |
| 1 | 0.419 | 0.920 | 0.455 | 0.39 | 0.383 | 0.482 | 0.946 | 0.510 | 0.45 | 0.442 |
| 2 | 0.354 | 0.596 | 0.594 | 0.33 | 0.321 | 0.438 | 0.727 | 0.602 | 0.41 | 0.400 |
| 3 | 0.254 | 0.346 | 0.734 | 0.23 | 0.230 | 0.320 | 0.431 | 0.742 | 0.29 | 0.286 |
| 4 | 0.147 | 0.168 | 0.875 | 0.13 | 0.131 | 0.193 | 0.221 | 0.873 | 0.17 | 0.170 |
| 5 | 0.065 | 0.065 | 1.000 | 0.06 | 0.058 | 0.084 | 0.084 | 1.000 | 0.07 | 0.075 |

Source: Authors Computation from GHS panel data, 2011 & 2013

**Changes in Multidimensional Poverty Indices**

The changes in MPI, head count ratio and intensity of poverty at $k = 3$ as contained in Table 4 reveals that the change is higher for H than A. This implies that efforts at alleviating poverty in rural Nigeria should focus more on reducing the number of the multidimensionally poor than in reducing the deprivation share of each of the multidimensionally poor. This is in agreement with the findings of Alkire *et al.* (2011) that changes in MPI in Nigeria, Lesotho and Kenya is achieved by reduction in H and hardly by reduction in A.

**Table 4: Changes in MPI, Headcount Ratio (H) and Intensity of Poverty (A) at *k* = 3**

| | **$M_0$** | | **H** | | **A** | |
|---|---|---|---|---|---|---|
| **Waves** | **Wave 1** | **Wave 2** | **Wave 1** | **Wave 2** | **Wave 1** | **Wave 2** |

| | | | |
|---|---|---|---|
| | 0.254 0.320 | 0.346 0.431 | 0.734 0.742 |
| Annual Absolute Change | 0.011 | 0.014 | 0.001 |
| Annual Percent Change | 4.33 | 4.10 | 0.18 |

Source: Authors Computation from GHS panel data, 2011 & 2013

**Relative Contribution of Dimensions to Multidimensional Poverty Index (MPI)**

The relative contributions of dimensions to multidimensional poverty during wave 1 and 2 at different cut-offs, *k* is shown in Table 5. The result reveals that the highest contribution is from health dimension with 35.58% and 30.62% at $k = 1$ in wave 1 and 2 respectively. This corroborates the findings of Ogunsola *et al.*, (2015) that improving the health condition of rural dwellers in Nigeria will go a long way in ensuring significant reduction in multidimensional poverty. While education contributed most to poverty in wave 1 followed by health and assets at $k = 3$, assets contributed most to poverty in wave 2 followed by health and education. Thus, the multidimensional poverty of rural households in Nigeria can be mainly attributed to lack of access to basic education, low level of assets and poor health condition of household heads.

**Table 5: Relative Contributions of Dimensions to MPI**

| **WAVE 1** | | | | | |
|---|---|---|---|---|---|
| ***K*** | **Housing Contribution (%)** | **Sanitation Contribution (%)** | **Education Contribution (%)** | **Health Contribution (%)** | **Assets Contribution (%)** |
| 1 | 13.68 | 12.06 | 20.77 | 35.58 | 17.91 |
| 2 | 15.18 | 13.42 | 23.55 | 27.13 | 20.72 |
| 3 | 15.91 | 13.72 | 24.48 | 23.13 | 22.76 |
| 4 | 19.39 | 16.70 | 22.50 | 19.97 | 21.44 |
| 5 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| **WAVE 2** | | | | | |
| ***K*** | **Housing Contribution (%)** | **Sanitation Contribution (%)** | **Education Contribution (%)** | **Health Contribution (%)** | **Assets Contribution (%)** |
| 1 | 13.26 | 11.85 | 18.42 | 30.62 | 25.85 |
| 2 | 14.11 | 12.53 | 19.40 | 27.66 | 26.29 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 17.02 | 14.22 | 21.27 | 23.18 | 24.32 |
| 4 | 20.62 | 16.05 | 21.06 | 20.32 | 21.96 |
| 5 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |

Source: Authors Computation from GHS panel data, 2011 & 2013

According to Table 6, multidimensional poverty indices increased for all zones between waves 1 and 2 except for the intensity of poverty that decreased from 0.696 to 0.662 for the South South zone. In all, North East recorded the highest poverty rate followed by North Central. Like all the other zones, North East and North Central recorded an increase in multidimensional poverty index from wave 1 to wave 2. Notably, the intensity of poverty in those two zones was equal and the highest of all the geopolitical zones. This could be linked to large family sizes, insurgents' activities and the relatively high illiteracy level prevalent in the Northern region of Nigeria. This corroborates the findings of Ifelunini *et al.* (2013) who found that the North East zone of Nigeria had the highest poverty depth. With respect to annual percentage change, rural households in South East experienced the highest percentage increase in poverty followed by the North Central zone while the South South had the lowest percentage increase in poverty.

**Table 6: Changes in MPI, Headcount Ratio and Intensity of Poverty at $k$ = 3 by Geopolitical Zones**

| Geo-Political Zones | Waves | $M_0$ | H | A |
|---|---|---|---|---|
| North Central | 1 | 0.392 | 0.499 | 0.785 |
| | 2 | 0.502 | 0.631 | 0.796 |
| Annual Absolute Change | | 0.018 | 0.022 | 0.002 |
| Annual Percentage Change | | 4.7 | 4.4 | 0.23 |
| North West | 1 | 0.202 | 0.284 | 0.711 |
| | 2 | 0.253 | 0.347 | 0.729 |
| Annual Absolute Change | | 0.009 | 0.011 | 0.003 |
| Annual Percentage Change | | 4.1 | 3.7 | 0.42 |
| North East | 1 | 0.466 | 0.594 | 0.785 |
| | 2 | 0.527 | 0.658 | 0.800 |
| Annual Absolute Change | | 0.010 | 0.011 | 0.003 |
| Annual Percentage Change | | 2.2 | 1.8 | 0.3 |

| | | | | |
|---|---|---|---|---|
| South East | 1 | 0.169 | 0.250 | 0.676 |
| | 2 | 0.262 | 0.367 | 0.714 |
| Annual Absolute Change | | 0.016 | 0.020 | 0.006 |
| Annual Percentage Change | | 9.2 | 7.8 | 0.9 |
| South South | 1 | 0.222 | 0.319 | 0.696 |
| | 2 | 0.239 | 0.361 | 0.662 |
| Annual Absolute Change | | 0.003 | 0.007 | 0.006 |
| Annual Percentage Change | | 1.3 | 2.2 | -0.8 |
| South West | 1 | 0.161 | 0.237 | 0.679 |
| | 2 | 0.193 | 0.281 | 0.687 |
| Annual Absolute Change | | 0.005 | 0.007 | 0.001 |
| Annual Percentage Change | | 3.3 | 3.1 | 0.02 |

Source: Authors Computation from GHS panel data, 2011 & 2013

**Multidimensional Poverty Transition Matrix**

The multidimensional poverty transition matrix in Table 7 indicates that 46.5% of households who were poor in wave 1 remained poor in wave 2 while 14.8% of households who were poor in wave 1 exited poverty in wave 2. On the other hand, the percentage of households that moved into poverty in the second wave was 8.2%. However, 30.5% of households were non-poor in both waves.

**Table 7: Poor/Non-Poor Transition Matrix**

| | | **WAVE 2** | | |
|---|---|---|---|---|
| | | **Poor** | **Non-Poor** | **Total** |
| **WAVE 1** | **Poor** | 1278<br>(46.5)* | 406<br>(14.8) | 1684<br>(61.3) |
| | **Non-Poor** | 224<br>(8.2) | 838<br>(30.5) | 1062<br>(38.7) |
| | **Total** | 1502<br>(54.7) | 1244<br>(45.3) | 2746<br>(100.0) |

Source: Authors Computation from GHS panel data, 2011 & 2013

**Top number is cell frequency and number in parenthesis is cell percentage*

Arising from the findings in Table 7, the figures in Table 8 indicates that the chronic and transient multidimensional poverty rates are 46.5% and 23.0% respectively. This suggests that the majority of rural households remained multidimensionally poor for a considerably long period of time. This result is in agreement with the findings of Aiyedogbon and Ohwofasa (2012) and Perpetual (2013) that poverty is predominantly chronic in Nigeria.

**Table 8: Multidimensional Poverty Decomposition (Spells Approach)**

| **Multidimensional Poverty Status** | **Number of Households** | **Percentage** |
|---|---|---|
| Always Multidimensionally Poor (Chronic) | 1278 | 46.5 |
| Sometimes Multidimensionally Poor (Transient) | 630 | 23.0 |
| Never Multidimensionally Poor | 838 | 30.5 |
| **Total** | **2746** | **100.0** |

Source: Authors Computation from GHS panel data, 2011 & 2013

**Multidimensional Poverty Profile of Rural Households**

Table 9 shows the multidimensional poverty profile of households in rural Nigeria by selected socio-economic characteristics. With respect to sex of household head, female headed households had a higher multidimensional poverty index ($M_0$) of 0.267. This might not be unconnected with the traditional marginalisation of women in rural communities leading to their owning fewer assets than their male counterpart or at best, relatively low value assets. Also, women's ability to accumulate assets is often governed by norms that historically have favoured men limiting the extent of women's control over assets (Kumar and Agnes, 2014). This is consistent with the findings of Adenuga *et al.* (2013) and Rogan (2014). The result also revealed that household heads between 61 and 90 years of age had the highest $M_0$ of 0.285 while household heads between 31 and 60 years of age had the lowest $M_0$ of 0.116. This is expected as household heads between 31 and 60 years of age are still economically active and could work harder to generate more income to cater for family needs.

Similarly, households with 11 and 15 members had the lowest multidimensional poverty index. Since family labour is usually employed in most rural communities for agricultural production, rural households with a greater number of members have more opportunity to improve their livelihood through increased production

and income leading to lower multidimensional poverty levels than those with smaller household sizes. The educational status profile of the households revealed that household heads with primary education had the highest $M_0$ of 0.725 followed by those with no formal education (0.492). This can be ascribed to the relatively high percentage of representative households (83.0%) having primary education in this study and the limited opportunities available for household heads having no post primary education to be gainfully employed by any firm or establishment in this technological driven 21st century. Also, with respect to marital status, household heads that were married had the highest $M_0$ of 0.387 while those who were never married had the least MPI of 0.170. This could be as a result of the added responsibilities associated with getting married which could greatly reduce resources available to increase assets, acquire more education and access better health care relative to those who are still single.

Confirming the findings above, the adjusted poverty gap ($M_1$) values and those of adjusted poverty severity ($M_2$) shown in Table 4.17 reveals that the households with the highest multidimensional poverty index ($M_0$) which includes female headed households, married household heads, household heads aged 61-90 years with 6 to 10 members, households having primary education and households residing in the North East zone were also the farthest from the poverty line and as such, hardest to lift out of poverty.

**Table 9: Multidimensional Poverty Profile of Households by Selected Characteristics in Rural Nigeria**

| Socio-Economic Characteristics | Multidimensional Poverty Index ($M_0$) | Adjusted Poverty Gap ($M_1$) | Adjusted Poverty Severity ($M_2$) |
|---|---|---|---|
| **Sex of Household Head** | | | |
| Male | 0.181 | 0.160 | 0.155 |
| Female | 0.267 | 0.250 | 0.243 |
| **Age** | | | |
| < 30 | 0.235 | 0.220 | 0.217 |
| 31-60 | 0.116 | 0.100 | 0.095 |
| 61-90 | 0.285 | 0.260 | 0.261 |
| 91-120 | 0.181 | 0.160 | 0.154 |
| **Household Size** | | | |
| 1-5 | 0.224 | 0.200 | 0.218 |
| 6-10 | 0.291 | 0.270 | 0.265 |

| | | | |
|---|---|---|---|
| 11-15 | 0.240 | 0.220 | 0.218 |
| >15 | 0.234 | 0.070 | 0.220 |
| **Educational Status** | | | |
| No Formal Education | 0.492 | 0.477 | 0.469 |
| Primary Education | 0.725 | 0.687 | 0.668 |
| Secondary Education | 0.235 | 0.219 | 0.212 |
| Tertiary Education | 0.116 | 0.108 | 0.104 |
| **Marital Status** | | | |
| Never Married | 0.170 | 0.154 | 0.146 |
| Married | 0.387 | 0.363 | 0.351 |
| Separated/Divorced | 0.276 | 0.258 | 0.249 |
| Widowed | 0.264 | 0.248 | 0.240 |
| **Geopolitical Zones** | | | |
| North Central | 0.392 | 0.356 | 0.338 |
| North West | 0.202 | 0.190 | 0.183 |
| North East | 0.466 | 0.436 | 0.422 |
| South East | 0.169 | 0.164 | 0.162 |
| South South | 0.222 | 0.209 | 0.202 |
| South West | 0.161 | 0.152 | 0.147 |

Source: Authors Computation from GHS panel data, 2011

**Factors Influencing Multidimensional Poverty Transitions**

This section presents the results of multinomial logit analysis for chronic and transient multidimensional poverty in the study area. Similar sets of explanatory variables were used in each case and the relative risk ratios (RRR) associated with the different explanatory variables are presented. With a log likelihood of -1938.7218 and a chi square statistics of 2741.70 significant at 1% (0.000), the model is well fitted.

**Determinants of Chronic Multidimensional Poverty**

As presented in Table 10, household size, toilet type, primary education, tertiary education, number of household assets acquired, land ownership, house ownership, distance to health care, wall material (mud), roof

material (grass), floor material (mud), use of firewood in cooking were the significant factors affecting the likelihood of households being chronically poor. The positive coefficient of distance to health care indicates that long distance to health care centre is strongly associated with chronic poverty in rural Nigeria. In other words, health care centers situated far from the residence of rural households contribute to their being chronically poor. This might be owing to the fact that additional resources which otherwise could have been used for some productive purposes by rural dwellers are expended on medical care. Also, when health care centers are not easily accessible, rural households might become discouraged altogether from taking the needed step or resort to unorthodox options which might worsen their situation, leaving them in an impoverished state that limits their productivity and capacity to create wealth.

In the same vein, the positive coefficient of housing conditions variables [toilet type, wall material (mud), roof material (grass), floor material (mud)] suggests that use of pit latrine and the use of mud as wall, roof and floor material increased the odds that rural households will be chronically poor. Same is true of use of firewood for cooking. Specifically, a unit increase in the use of firewood for cooking and use of mud as floor material increases the odds of households being chronically poor by a factor of 0.086 and 0.065 respectively. The implication of this is that in as much as rural households live in mud houses with pit latrine type of toilet and use firewood for cooking, there is high likelihood that they will persist in multidimensional poverty. After all, the traditional way of living poses a serious health risk to the occupants for obvious reasons. People living in mud houses are exposed to the climate due to leaks in walls and roof which might lead to diseases such as pneumonia. The unpleasant smoke from the open fireplace may equally cause diseases.

The negative but significant coefficient of household size implies that as household members increase, the probability that households will experience chronic poverty decreases. Precisely, an additional member to the household reduced the likelihood of slipping into chronic poverty by 0.951. This could be attributed to additional labour that would be supplied by the new member(s) of the household leading to increased returns that can be used to attend to other vital matters in which they are deprived. This corroborates the findings of Nyariki *et al*. (2002) and Tsehay and Bauer (2012) but contrary to the findings of Arif and Bilquees (2006) and Adepoju (2012) who found that larger families are more likely to stay in poverty.

Similarly, primary and tertiary education of household head variables had negative coefficients supporting the view that increased years of education decrease the probability that a household will be chronically poor. The corresponding relative risk ratio shows that having primary and secondary education decreased the odds of being chronically poor by 0.122 and 0.026 respectively. This implies that household heads

with primary education have a higher likelihood of not remaining in poverty than a household head with no formal education while a household head having tertiary education has a higher likelihood of exiting poverty than one with primary education. This is consistent with the findings of World Bank (2002) and Bigsten and Shimeles (2003) that formal education of household head decreases poverty since educated household heads are better poised to cope with risk and uncertainty.

With respect to the number of assets acquired which was negatively significant, an increase in the number of assets acquired by households reduced their duration of poverty. Put differently, a unit increase in the number of assets owned by households decreased the likelihood of households remaining multidimensionally poor by 0.953. When assets are put into productive use, households become better off through increased income. Alisjahbana and Yusuf (2003), Imai and You (2013) and Nisar *et al.* (2013) confirmed this finding. That an increase in the number of assets reduces the chances of households remaining multidimensionally poor explains why land ownership and house ownership also have the negative sign. That is, owning a house and owning an agricultural land reduce the odds that households will remain chronically poor for a long time by 0.582 and 0.019 respectively. This is in line with the findings of Oyekale (2011) and Hokayem and Heggenss (2013) who found that owning a house decreases the probability of being multidimensionally poor.

**Table 10: Multinomial Logit Regression Result for the Determinants of Chronic and Transient Multidimensional Poverty**

| | **Chronic Poverty** | | | **Exiting Poverty** | | | **Moving into Poverty** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **RRR** | **Coeff** | **z-value** | **RRR** | **Coeff** | **z-value** | **RRR** | **Coeff** | **z-value** |
| Sex | 1.063 | 0.061 | 0.13 | 1.741 | 0.554 | 1.11 | 0.502 | -0.632 | -1.46 |
| Age | 0.999 | -0.001 | -0.09 | 1.000 | 0.000 | 0.00 | 0.989 | -0.011 | -1.60 |
| Marital Status (b: Married) | 0.830 | -0.186 | -0.31 | 0.907 | -0.097 | -0.16 | 2.225 | 0.800 | 1.74* |
| Never Married | 1.149 | 0.139 | 0.25 | 0.706 | -0.348 | -0.58 | 2.705 | 0.995 | 1.99** |
| Separated/Divorced | 1.371 | 0.135 | 0.64 | 0.736 | -0.307 | -0.59 | 1.954 | 0.670 | 1.38 |
| Widowed | 0.951 | -0.050 | -1.69* | 0.962 | -0.039 | -1.27 | 1.071 | 0.076 | 2.47** |
| Household Size | 0.078 | 2.555 | 13.96*** | 0.113 | -2.179 | -11.69*** | 0.525 | -0.644 | -0.76 |
| Toilet Type | 1.264 | 0.234 | 1.10 | 1.150 | -0.140 | 0.63 | 1.309 | 0.269 | 1.30 |
| Credit Access | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Educational status (b: No Formal Education) | 0.122 | -2.100 | -6.61*** | 0.162 | 1.819 | 5.52*** | 0.197 | -1.079 | -3.34*** |
| Primary | 3.60e-07 | -14.637 | -0.03 | 0.416 | 0.878 | 0.32 | 1.088 | 0.084 | 0.07 |
| Secondary | 0.026 | -3.660 | -7.70*** | 0.117 | 2.143 | 5.03*** | 0.340 | -1.624 | - |
| Tertiary | 0.953 | -0.048 | -4.64*** | 0.972 | - 0.028 | -3.22*** | 0.955 | -0.046 | 4.07*** |
| Asset count | 1.000 | -3.77e-07 | -0.09 | 1.000 | -6.08e-06 | -1.36 | 1.000 | -0.004 | - |
| Monthly Expenditure | 0.582 | -0.541 | -2.36** | 0.860 | -0.151 | -0.65 | 0.697 | -0.362 | 3.71*** |
| House Ownership | 0.019 | -3.945 | - 17.80*** | 0.040 | 3.227 | 14.41*** | 0.424 | -0.858 | -0.94 |
| Land Ownership | 1.071 | 0.069 | 6.95*** | 1.015 | 0.015 | 1.13 | 1.056 | 0.055 | -1.60 |
| Distance to Health Centre | 0.751 | -0.286 | -0.84 | 0.895 | -0.111 | -0.31 | 0.868 | -0.142 | - |
| Membership in Coop. | 1.106 | 0.101 | 0.20 | 2.102 | 0.743 | 1.53 | 1.031 | 0.030 | 3.59*** |
| Access to Remittances | 0.034 | 3.377 | 16.60*** | 0.061 | -2.801 | -13.67*** | 0.262 | -1.339 | 6.33*** |
| Wall Material (Mud) | 0.014 | 4.251 | 11.60*** | 0.054 | -2.911 | -7.72*** | 0.201 | -1.605 | -0.41 |
| Roof Material (Grass) | 0.065 | 2.734 | 10.50*** | 0.117 | -2.146 | -8.11*** | 0.685 | -0.378 | 0.06 |
| Floor Material (Mud) | 0.086 | 2.449 | 7.86*** | 0.095 | -2.353 | -6.78*** | 0.643 | 0.441 | -0.12 |
| Firewood | 3.72e+13 | 31.246 | 16.37 | 5.38e+09 | 22.406 | 11.78 | 19834. | 9.895 | -0.65 |
| Constant | | | | | | | 5 | | -1.16 |
| | | | | | | | | | 1.83* |
| | | | | | | | | | 5.30 |

Source: Authors Computation from GHS panel data, 2011

Note: b = base category omitted in the regression for categorical variable. ***, **, * Significant at 1%, 5% and 10% respectively

Observations = 2746; LR $chi^2$ (22) = 2741.70; Prob > $chi^2$ = 0.000

Log likelihood = -1938.7218; Pseudo $R^2$ = 0.4142

Dependent variable: Multidimensional poverty status (0=non-poor,1=chronic poor,2=poor-non-poor,3=non poor-poor),with base category poverty status=0.

**Determinants of Transient Multidimensional Poverty (Exiting Poverty)**

The results shown in Table 10 also indicates that toilet type, household head having primary and tertiary education, number of household assets owned, land ownership, wall material (mud), roof material (grass), floor material (mud) and use of firewood for cooking are statistically significant factors explaining households' exit from poverty. The positive coefficient associated with primary and tertiary education of household head suggests that possession of these human capital variables increased the chance of the rural poor leaving poverty. Secular education opens a door of opportunities that can ultimately lead to households transitioning from the poor to non-poor status through gainful employment or skills and knowledge acquisition. Even when a household head who had received one formal education or the other is presently unemployed but continues to acquire more education, chances are that he/she will someday start realising returns on the years invested in education. This result agrees with the findings of Zhang (2008) and Imai and You (2013) that household heads with higher education are more likely to exit poverty.

Similarly, ownership of agricultural land had positive impact on movement out of poverty. Specifically, owning an agricultural land increased the probability of exit from poverty by 0.040. This shows that acquisition of land by households play a significant role in lifting the rural poor out of poverty in rural Nigeria. Households who own agricultural land usually engage in production of crops or animals at either the subsistence or commercial level. When it is done at the subsistence level, money that would otherwise be spent on some food materials would be saved for use in other vital household matters. When production is commercialised, increased earnings will result. Hence, ownership of land by rural households increases their chances of breaking the vicious circle of poverty in its multidimensional nature.

With respect to assets, the negative and significant coefficient of 0.028 indicates that additional asset acquisition reduced the odds that households will be freed from poverty. Purchase of additional household assets limits the money available for households to take care of some vital, urgent matters that might contribute appreciably to their exit from poverty. Except additional household assets can be put to productive use in one way or the other, there is the tendency that poverty will persist.

Also, the effect of housing condition and living standard variables [wall material (mud), roof material (grass), floor material (mud), pit laterine and use of firewood for cooking] on the likelihood of exiting poverty was negative with a RRR of 0.061, 0.054, 0.117, 0.113 and 0.095 respectively. This implies that households living in an apartment built with locally sourced materials (mud and grass) and who use firewood as a source of energy for cooking have a higher likelihood of remaining poor. These are reflections of the socio-economic status and the level of welfare of the households.

**Determinants of Transient Multidimensional Poverty (Entering Poverty)**

According to Table 4.29, movement into multidimensional poverty is a function of household size, primary and tertiary education of household head, number of household assets, land ownership, distance to health centre, use of firewood for cooking and marital status (never married and divorced). While marital status (never married and divorced), household size, distance to health centre and use of firewood in cooking positively influenced the odds of entering poverty, primary and tertiary education of household head, land ownership and number of household assets had negative impact on the probability that households will become poor. The positive coefficient of household heads who have never married, that is, single household heads implies that being single increase the likelihood that a non-poor household will be poor. This might not be unconnected with the fact that single household heads unlike married household heads will not be able to enjoy the benefits of pooling of resources together which to a large extent serve as a bulwark from slipping to poverty (Cappellari and Jenkins, 2002; Hokayem and Heggeness, 2013). In the same vein, the positive coefficient of being separated or divorced indicates that not living with one's mate increases the probability of moving into poverty. This could be attributed to the fact that separation and divorce often leads to the shouldering of responsibilities previously shared by two individuals.

Also positively significant in explaining movement of households into poverty is household size. That is, as household members increase, the probability that households will fall into poverty increases. Specifically, an additional member to the household increased the likelihood of slipping into poverty by 1.071. Increase in household size can prove to be a negative force with respect to household welfare since it could exert additional pressure on the limited resources that rural households have to survive. This agrees with the findings of Nisar *et al.* (2013) who found that additional person to household increases the likelihood that households will be poor.

Distance to health care also increased the probability that households will fall into poverty by 1.056 as shown by the positive sign which is significant at 1%. The implication of this is that the farther the health care centres from the residence of households, the higher the likelihood that a non-poor household will become poor. This is similar to the findings of Margwa *et al.* (2015) that the longer the distance to health centres, the higher the chance that a rural household will become poor.

With respect to use of firewood in cooking, the positive and significant coefficient indicates that a poor state of household well being is capable of making a non-poor household fall into poverty due to the resulting health implication. This result is consistent with the findings of UNDP (2002), Adedayo (2005) and Zaku *et al.*

(2013) that poverty is a key factor in wood fuel consumption coupled with the growing population with a larger segment having falling incomes that cannot afford the cost of conventional fuels.

The negative coefficient of primary and tertiary education of household heads and the RRR value of 0.197 and 0.340 respectively suggest that having primary and tertiary education decrease the odds that a non-poor household will become poor. However, having tertiary education decreased the odds of entering poverty more. Since primary education in Nigeria was of greater standard some years ago compared to what obtains now and since the average age of household heads stood at approximately 50 years, it can be said that the basic reading and writing skills acquired by some will likely help in keeping them away from poverty. However, for those with tertiary education, chances are that they are meeting their present needs and planning for possible future needs. For those who are yet to be gainfully employed, there stands a better chance of being engaged in a profitable endeavour due to the depth of knowledge acquired, exposure received and services that can be provided at a cost.

Further, ownership of agricultural land and assets had negative impact on the odds of entering poverty. That is, the possession of land for agricultural production reduces the likelihood that households will slip into poverty. Proceeds from farming to a reasonable extent would have helped households in attending to issues related to welfare and education thereby preventing a fall to multiple deprivation. Likewise, an increase in assets decreases the possibility of a non-poor household becoming poor. Specifically, an additional asset acquired reduced the chances of movement into poverty by 0.955. This could be attributed to the use of additional assets to generate additional wealth which in turn is used for the management and sustenance of all family members.

**CONCLUSION AND POLICY RECOMMENDATIONS**

The study concludes that multidimensional poverty among households in rural Nigeria is primarily chronic. This is evident in the observed increase in the multidimensional poverty index (MPI) between wave 1 and 2 at the different cut-offs, *k* which was mainly due to lack of access to basic education, low level of assets and poor health condition of household heads. Generally, multidimensionally poor households were largely female headed, married household heads between 61 and 90 years of age, residing in the North East zone of Nigeria and having between 6 and 10 members.

The study also revealed that movement of households into and out of multidimensional poverty is basically influenced by education variables, number of assets owned, ownership of land, wall material (mud), roof material (grass), use of pit latrine and use of firewood for cooking. However, being single and divorced, household size, distance to health centre, use of firewood in cooking, land ownership and number of assets

owned were the statistically significant factors explaining chronic multidimensional poverty among rural households in Nigeria. Hence, the promotion of basic education for all, creation of scholarship schemes specifically targeted at encouraging those who demonstrate academic excellence to pursue additional education and the enactment and implementation of relevant laws against gender discrimination and marginalization of rural women (widowed and divorced inclusive) in ownership of assets are imperative policy requirements in the alleviation of multidimensional poverty in rural Nigeria.

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