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Poverty Analysis of Rice Farming Households: A Multidimensional Approach

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Abstract

The official measurement and analysis of poverty in Nigeria has historically relied upon the single dimension, consumption based monetary approach with little attention on multidimensional poverty assessment. This study was therefore carried out to assess the multidimensional poverty index of rice farming households in Nasarawa/Benue Rice Hub, Nigeria. The study employed stratified random sampling technique to select 149 rice farming households in the study area. Descriptive statistics, the Alkire and Foster Multidimensional Poverty Index Methodology using two different cut-off points and the Tobit regression model were the main analytical tools employed for the study. The results of the multidimensional poverty index analysis revealed that female headed households were poorer than the male headed households. On the overall, 66 percent of the rice farming households was multidimensionally poor. The study also showed that the rice farming households were deprived in 48 percent of the dimensions. A multidimensional poverty index of 0.32 was obtained for the rice farming households in the study area with varying values obtained for the male and female headed households. The result of the Tobit regression model showed that gender of the household head, health, marital status and membership of association were the major determinants of multidimensional poverty of the rice farming households in the study area. The study concluded that the rice farming households in the study area were multidimensionally poor. It was recommended that the government should give priorities to the development of the rural areas with special consideration for women through the provision of essential infrastructural facilities.

Keywords: Rice, multidimensional poverty, farming households, determinants

1. Introduction

Nigeria is the most populous country in Africa, with a population of about 168 million people. Its domestic economy is dominated by agriculture, which accounts for about 40% of the Gross Domestic Product (GDP) and two-thirds of the labour force. Agriculture supplies food, raw materials and generates household income for the majority of the people [18]. The food sub-sector of Nigerian agriculture parades a large array of staple crops. Of all the staple crops, rice has risen to a position of pre-eminence. Rice is a very important food crop globally. It is an ancient crop consumed as healthy and staple food by more than half of the world population [16]. It ranks third after wheat and maize in terms of worldwide production [20]. Since the mid-1970s, rice consumption in Nigeria has risen tremendously; at about 10% per annum. Domestic production has never been able to meet the demand, leading to considerable imports. According to the Federal Government of Nigeria, the country is currently the largest rice importer in the world spending N365billion ($2.27billion) per year importing 2.1 million MT of milled rice [26]. Rice production in Nigeria is dominated by small holder farmers who use traditional manual methods that are characterised with problems of low productivity and consequently poor livelihood [34]. In spite of the importance of the rice crop to the national economy, majority of the rice farmers remain poor. The country's abundant human, capital and natural resources have not transcends into improved standard of living for the population. Nigeria remains one of the poorest countries in the world. Poverty is widespread in the country and has increased since the late 1990s. About 100 million Nigerians of the estimated 168 million people live on less than $1 per day and the country was ranked 142nd out of 175

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countries in 2010 by the United Nations Human Development Index [32, 19]. The percentage of Nigerians living in absolute poverty, rose to 60.9 per cent in 2010, compared to 54.7 per cent in 2004 and the situation is even more severe in the North-Western and North-Eastern part of the country where a staggering 77.7 percent and 76.3 percent respectively are poor [25]. Income inequality has also risen from 0.429 in 2004 to 0.447 in 2010 [25]**.** Poverty according to [35] is defined as pronounced deprivation in well-being, and comprises many dimensions. It includes low incomes and the inability to acquire the basic goods and services necessary for survival with dignity. Poverty also encompasses low levels of health and education, poor access to clean water and sanitation, inadequate physical security, lack of voice, and insufficient capacity and opportunity to better one's life. Poverty is not only a state of existence but also a process with many dimensions and complexities [21]. The Federal Office of Statistic/World Bank in their analysis of the poverty trend in Nigeria noted that poor families are in higher proportion in farming household that are mainly in the rural areas [1, 22].

The official measurement and analysis of poverty in Nigeria has historically relied upon the single dimension, consumption based monetary approach with little attention on multidimensional poverty assessment. However, recent developments in literature on poverty measurement have highlighted serious limitations of monetary approaches to measure poverty [23, 26]. Policymakers in both developed and developing nations have stressed the need to focus on how policy affects multiple dimensions of well-being such as sanitation, consumption, health, political access, education, among others, in addition to income. Poverty is a multidimensional phenomenon and should therefore be measured by considering multiple indicators of wellbeing. There is need to consider poverty from the multidimensional point of view because in addition to insufficient income, other attributes like literacy and access to health care can determine the level of economic well being. To achieve the Millennium Development Goals (MDGs) for which Nigeria is a signatory, careful attention must be paid to understanding the concept of multidimensional poverty In view of the foregoing, this study was carried out to assess the multidimensional poverty index of the rice farming households and to analyse the determinants of multidimensional poverty in the study area.

2. Methodology

2.1. Study Area

The study was carried out in the Nasarawa/Benue hub of Nigeria. The hub is one of the two major rice hubs in Nigeria and lies within the guinea Savannah region of the country with very fertile soils for rice production. The rice hub shares in the benefits of the Benue river valley for rice production. Rice Sector Development Hubs are zones where rice research outputs are integrated across the rice value chain to achieve development outcomes and impact. The Hub involves large groups of farmers and other value-chain actors, such as rice millers, input dealers and rice marketers [14]. The Nasarawa/Benue hub is made up of four local government areas of Guma and Gwer-west in Benue state and Lafia and Obi Local government areas in Nasarawa state. Benue state is located within longitude 7° 47' and 10° 0' East and Latitude 6° 25' and 8° 8' North while Nasarawa state is located within 8°32′ and 8.533°North and 8°18′ and 8.3°East [33]**.** The states are among the North Central states of Nigeria and are highly agrarian with a large percentage of their populace engaged in rice farming and other agricultural activities. Rain fed upland and rain fed lowland are the major rice production ecologies in the study area. Both states share a common boundary and have rich and diverse agricultural produce which include rice, yams, beans, cassava, potatoes, maize, Soya beans, sorghum, millet and coco-yam.

2.2. Sources of Data

The study made use of primary data from the NCRI/Africa Rice baseline survey during which tablet computers were used to obtain information from the rice farming households. Africa Rice Centre in 2012 developed the Mlax application on Tablet computers to collect baseline data in the Rice Sector in Africa. It is designed in such a way that data collected are sent to the server automatically by simply connecting to the internet and running the application. The data was collected by 9 trained enumerators. Primary data relating to the socioeconomic characteristics, farmers' welfare and farm characteristics of the respondents were collected and used for analysis.

2.3. Sampling Technique

A stratified random sampling technique was used to collect the data for this study. The target ecology was lowland and upland rice farming households in

the hub. A list of all villages in the hub was constructed after which villages where rice is not produced or where rice is not grown in the target ecology were sorted out, so that, only villages where rice is grown in the target ecology were left. All remaining villages where then grouped into 3 homogeneous classes (strata) using village accessibility as a criterion. These are: "villages with good accessibility throughout the year", "villages with poor accessibility" and "villages with very limited accessibility". Accessibility in this context is related to both road condition and distance from an urban area. Due to the high intensity of the field activities, villages with very limited access were not considered. Each of the two remaining village group were then classified into two classes based on dominant crops (rice in the target ecology as major crop and rice in the target ecology as minor crop). The 'accessibility' and 'dominant crop' criteria then resulted into for 4 strata of villages namely: villages with poor access but with rice as major crop, villages with poor access but with rice as minor crop, villages with good access but with rice as major crop and villages with good access but with rice as minor crop From each of the stratum, 8 villages were then randomly selected to make up a total of 32 villages. 5 households were then be randomly selected from each of the 32 villages such that in total, we had 160 rice farming households. However, due to time constraints, only data from 149 households were found useful for analysis.

2.4. Method of Data Collection

Data was collected using two questionnaire schedules: the village level and household level questionnaires. The village level questionnaire was administered to obtain information from key informants in each village through a focus group discussion where questions relating to the socio-economic and demographic characteristics and the multidimensional poverty status of each of the rice farming households were asked.

2.5. Method of Data Analysis

Various analytical tools and procedures were employed for this study. Descriptive statistics such as percentages, frequencies and means were used to explain the demographic and socio-economic characteristics of the respondents. The Alkire and Foster Measure (AFM) of estimating multidimensional poverty index was used to estimate the multidimensional poverty indices of the rice farming households while the Tobit regression model was used to analyse the determinants of multidimensional poverty.

2.6. Multidimensional Poverty Index

The methodology developed by [5, 6, 7] was used to measure the multidimensional poverty index of the rice farming households. The measure is a robust measure as it is specifically designed for categorical/ordinal data. This methodology satisfies axioms such as decomposability (useful in targeting) and dimensional monotonicity [6, 7]. The methodology includes two steps: an identification method ($\boldsymbol{\rho}$k) 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$\boldsymbol{\alpha}$) (based on traditional FGT measures) that can be broken down to target the poorest people and the dimensions in which they are most deprived. 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 [17]. 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 [28, 29], Multiple Correspondence analysis, regression based weights and normative weights [17]. 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. The most commonly used approach however is the equal weighting system due to its convenience [12]. The headcount (H_o) and the dimension-adjusted headcount ratio (M_o) are used to identify and measure multidimensional poverty.

2.7. Dimensions, indicators and deprivation cutoffs

The MPI uses ten indicators belonging to three dimensions (Health, Education and Standard of Living) which mirror the HDI. Their intrinsic and instrumental value is available in [4]. The MPI has 10 indicators: two for health, two for education and six for living standards. Table 1 summarizes the dimensions, indicators, thresholds and weights used in the MPI. To explore the sensitivity of multidimensional poverty index multiple cutoffs can be implemented. The MPI explicitly weighs each dimension equally and each indicator within the dimension equally. Equal weighting between the

dimensions follows the HDI convention, upon which a critical literature has developed [10, 13, 4].

The variable k reflects the sum of weighted indicators in which a household must be deprived in order to be considered multidimensionally poor. For this study, we made use of two values for k: k= 3 and k= 2. When k = 3, a household has to be deprived in at least the equivalent of 30 percent of the weighted indicators (3 indicators) in order to be multidimensionally poor. This amounts to six asset indicators or two health or education indicators. If we choose instead cutoff value k = 2 then all poor households must be deprived in at least 20 percent of the indicators (two to four indicators)

Table 1: Dimensions, Indicators and Weights

Dimensions	*Indicators*	*Measurements*	*Weights*
Education	Years of schooling	Deprived if no household member has completed 9 years of formal education	1/6
	Child enrolment	deprived if any school-aged child is not attending school in years 1 to 6	1/6
Standard of Living	Electricity	Deprived if the household has no electricity	1/18
	Drinking water	Deprived if the household does not have access to clean drinking water or clean water is more than 30 minutes walk from home	1/18
	Sanitation	Deprived if they do not have an improved toilet or if their toilet is shared	1/18
	Housing	Deprived if hut/house/ has a dirt, sand or dung floor or is built with sub-standard material	1/18
	Cooking fuel	Deprived if they cook with wood, charcoal or dung	1/18
	Assets	Deprived if the household does not own more than one of: radio, TV, telephone, bike, or motorbike, and do not own a car or tractor	1/18
Health	Health care quality	Deprived if the household does not have access to quality health care	1/6
	Health as a Limiting factor	Deprived if health is a limiting factor in most regular activities	1/6

Source: Adapted from [4].

Figure 1: Indicators of Multidimensional Poverty index. Source: Adapted from [4]

2.8. The notation

Let y= [y_{ij}] denote the n x d matrix of achievements, where n represents the number of rice farming households, d is the number of dimensions and yij ≥ 0 is the achievement of household i= 1, 2…..,n in dimension j= 1,2,…d. Each row vector y_{ij} = y_{i1}, y_{i2},…., y_{id} lists the household's i's achievements, while each column vector $y_{\square j}$ = y_{1j},y_{2j},….y_{nj} gives the distribution of dimension j achievements across the set of rice farming households . A vector z = (z_1,…,z_d) of deprivation cutoffs (one for each dimension) is used to determine whether a household is deprived. If the household's achievement level in a given dimension j falls short of the respective deprivation cut off zj, the household is said to be deprived in that dimension; if the household's level is at least as great as the deprivation cutoff, the household is not deprived in that dimension.

2.9. Identification method

A vector w = (w_1,…,w_d) of weights or deprivation values is used to indicate the relative importance of the different deprivations and all weights sum up to the number of dimensions "d".

Following [5], the vector c of deprivation counts is compared against a cutoff "k" to identify the poor, where k = 1…d. A column vector c = (c_1 … c_n)' of deprivation counts reflects the breadth of each household's deprivation. The ith household deprivation count c_i is the number of deprivations experienced by i or the sum of the values of the deprivations experienced by i (in the general case). A poverty cutoff k satisfying 0 < k ≤ d is then used to determine whether a farmer has sufficient deprivations to be considered poor. If the ith household's deprivation count c_i falls below k, the household is not considered to be poor; if the household's deprivation count is k or above, the farmer is identified as being poor. Hence, the identification method **ρ** is defined as $\boldsymbol{\rho}$k (yi;z) = 1 whenever $c_i \geq k$, and $\boldsymbol{\rho}$k(yi;z) = 0 whenever $c_i < k$. The identification function summarizes the outcome of the above process and indicates whether a farmer is poor in Y given deprivation cutoffs z, weights w, and poverty cutoff k. If the household is poor, the identification function takes on a value of one; if the household is not poor, the identification function has a value of zero.

Specifically, the deprivation headcount (H_o) and the dimension adjusted head count (M_o) model following [15, 6], is given as follows

$$H_o (X; k; Z) \equiv \frac{1}{N}\sum_{n=1}^{N} I (Cn \geq k) = \frac{q}{N} \text{.....(X)}$$

$$A (X; k; Z) = \frac{\sum_{n=1}^{N} I (Cn \geq k) Cn}{q} = \frac{\sum_{1}^{q} c}{q} \text{.....(XI)}$$

$$M_o = H_o \times A \text{..... .....(XII)}$$

Where:

H = Head Count Ratio

A = Average intensity of deprivation

M_0 = Adjusted headcount ratio or the Multidimensional Poverty Index (MPI).

q = the number of people who are multidimensionally poor

N= Total population

C= is the deprivation score that the poor experience

I () = indicator that takes the value of 1 if the expression in parenthesis is true. Otherwise it takes the value of 0

Multidimensional poverty (M_o) is measured by the adjusted headcount ratio otherwise called the multidimensional poverty index (MPI). It is calculated as the product of Headcount ratio (H_o) or percentage of people who are poor and the average intensity of deprivation 'A' which is the average deprivation score of the multidimensionally poor people. The M_o value summarizes information on the multiple deprivations into a single number.

2.10. The Tobit Regression Model

Comparing with the Local average response function, the Tobit regression model was used to establish the relationship between the depth of multidimensional poverty and the various factors affecting it. The application of Tobit analysis is preferred because it employs both data at the limit as well as those above the limit. The model better handles censored dependent variables and it is superior to the logit and probit model in terms of measuring the probability and the intensity of multidimensional poverty.

According to [24], the Tobit model is specified as follows:

$$Y_i = Y_i^* = \beta X_i + u_i \text{ if } Y_i^* > C \text{.....(XV)}$$

$$0 = \beta X_i + u_i \text{ if } Y_i^* < C \text{.....(XVI)}$$

Where: Y_i is the limited dependent variable, it is discrete when the household is not multidimensionally poor (it assumes zero value in this case) and continuous when they are poor that is equal to Y_i^*. Y_i is the multidimensional poverty index and X_i is the vector of explanatory variables; β is k x 1 the vector of unknown parameters to be estimated and u_i is independently distributed error term with zero mean and constant variance σ^2. C is a non-observable

threshold level and it is equal to 0.3. The independent variables hypothesised as determinants of multidimensional poverty for the rice farming households are specified as follows:

$Y_i = \beta_0 + \beta_1 X1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu i$……..(XVII)

Where:

X_1 = Gender

X_2 = Health status of the Household Head (number of sickness in a production year)

X_3 = Educational Level of Household Head in years

X_4 = Marital status (dummy; Yes=1; No=0)

X_5= Age of Household Head in years

X_6 = Access to Credit (Amount of credit obtained)

X_7= Membership of Association (dummy; Yes=1; No=0)

X_{10}= education of the person with the highest level of education in the household in years

μi = Error term

3. Results And Disccussion

3.1. Socioeconomic and Demographic Characteristics of the Rice Farming Households

Table 1 gives a summary of the socioeconomic characteristics of the rice farming households in the study area. The mean age of the rice farming households was 50.17 and the modal age was 41-50 years. Only 12 percent of the rice farming household is headed by female. This implies that rice farming in the study area is dominated by males. About 87 percent of the respondents are married. This may be in view of the fact that early marriage is highly encouraged in the study area. The average household size was 8 persons per household and the maximum number of persons per household was 25. The relatively large family size in the study area can be attributed to the prevalence of extensive family system in the study area and the need for family labour. As much as 32 percent of the respondents had no formal education and only 14 percent had tertiary education.

Only 42 percent of the rice farming households claimed they were members of farmers' association. On the average, rice farmers' membership of association in the study area was low. Some of the farmers claimed they have refused to be members of any association because of non-functionality of the associations. About 48 percent of the respondents had access to non agricultural income. Sources of non agricultural income include trading, motor cycle transportation etc. Only about 10 percent of the respondents had access to credit. This implies that access to formal credit by the rice farmers in the study area is very low. It was also found from the study that only a very small proportion of loans accessed actually went into financing farm operations as some part of loans taken almost certainly went into domestic consumption.

Table 2: Socioeconomic characteristics of the Rice Farming Households

Characteristics	*Frequency*	*Percentage*
Age of Household Head		
20-30	8	5.37
31-40	32	21.48
41-50	44	29.53
51-60	36	24.16
>60	28	18.79
Total	**149**	**100**
Gender		
Male	131	87.92
Female	18	12.08
Total	**149**	**100**
Marital Status		
Married	131	87.92
Single	1	0.67
Widow/Widower	17	11.41
Total	**149**	**100**
Household size		
1-5	40	26.85
6-10	68	45.64
11-20	33	22.15
>20	8	5.37
Total	**149**	**100**
Educational Level		
No Formal Education	48	32.21
Quranic	9	6.04
Primary	31	20.81
Junior secondary	11	7.38
Senior secondary	28	18.79
Tertiary	22	14.77
Total	**149**	**100**
Membership of Association		
Yes	64	42.95
No	85	57.05
Total	**149**	**100**
Non Agricultural Income		
Yes	72	48.32
No	77	51.68
Total	**139**	**100**
Access to Credit		
Yes	16	10.74
No	133	89.26
Total	**149**	**100**

Source: Author's Computation from Survey Data, 2013

Table 2 gives an overview of the farmers' asset disaggregated by gender. The results show that about

50 percent of the male and female headed households have access to mobile phone. While 88 percent of the male headed households have access to radio, only about 55 percent of the female headed households have access to radio. None of the female headed households had a vehicle. While about 34 percent of the male headed households had access to television, only about 22 percent of the female.

3.2. Incidence of Deprivation across Indicators Disaggregated by Gender

Descriptive analysis of the incidence of deprivation across indicators presented in table 3 and figure 2 showed that the female headed households are more deprived than the male headed households in 8 of the 10 indicators. This implies that female headed households suffer more deprivations than their male counterparts.

On the overall, the farmers suffer less deprivation in the education dimension compared to other dimensions. This low deprivation status in the education dimension could be attributed to the drive by the Universal Basic Education (UBE) programme of the government to achieve the millennium development goal in education through free and compulsory basic education programme. For the health dimension, access to quality health care is the indicator for which the farming households are most deprived with the female headed households being less deprived than the male headed households. This implies that quality health care facilities are lacking in the study area. For the standard of living dimension, 100 percent of the female headed households are deprived in the sanitation and cooking fuel indicators. On the overall, the rice farming households suffer the highest deprivation in the cooking fuel indicator. Most of households are deprived in one to six indicators. The results showed that the standard of living of the rice farming households in the study area is very low given their deprivation status.

Table 3: Overview of Farmers' Asset

Asset ownership	*Head of Household*				*Total*	
	Male		Female			
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Phone	67	51.15	9	50.00	76	51.01
TV	45	34.35	4	22.22	49	32.89
Vehicle	9	6.87	0	0	9	6.04
Motocycle	95	72.52	8	44.44	103	69.13
Radio	116	88.55	10	55.56	126	84.56

Source: Author's Computation from Survey Data, 2013

Table 4: Incidence of Deprivation across Indicators

Dimensionsns	***Male***		***Female***		***Pooled***	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Education						
Basic Education	25	19.08	5	27.78	30	20.13
Enrolment	20	15.27	5	27.78	25	16.78
Health						
Quality of Health care	63	48.09	7	38.89	70	46.98
Sickness	25	19.08	5	27.78	30	20.13
Standard of Living						
Electricity	101	77.10	14	77.78	115	77.18
Clean Water	81	61.83	13	72.22	94	63.09
Sanitation	116	88.55	18	100	134	89.93
Housing	36	27.48	4	22.22	40	26.85
Cooking Fuel	129	98.47	18	100	147	98.66
Asset	31	23.66	10	55.86	41	27.52

Source: Author's Computation from Survey Data, 2013

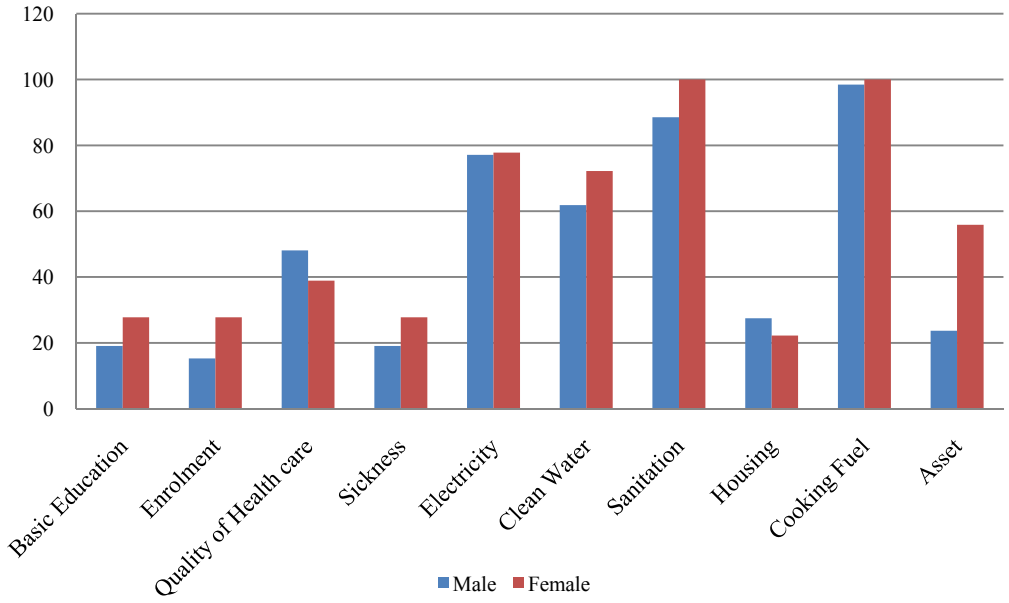

Figure 2: Incidence of deprivation across indicators disaggregated by gender. Source: Author's Computation from Survey Data, 2013

Table 5: Poverty Indices of the Rice Farming Households

Parameters	Males	Females	Pooled
When K=3			
Multidimensional Headcount (H_0)	0.63	0.77	0.66
Intensity of Poverty (A)	0.49	0.49	0.48
Multidimensional Poverty Index (M0)	0.31	0.38	0.32
When K=2			
Multidimensional Headcount (H_0)	0.83	1	0.85
Intensity of Poverty (A)	0.43	0.46	0.38
Multidimensional Poverty Index (M0)	0.38	0.46	0.32

Source: Author's Computation from Survey Data, 2013

3.3. Multidimensional Poverty Index and Deprivation Count of the Rice Farming Households

As explained in the methodology, A household and everybody in it is declared multidimensionally poor if its multidimensional poverty index exceeds the minimum cut-off point (k) of 30 percent or 0.3 at k= 3 and 20 percent or 0.2 at k=2. Table 4 presents the estimated poverty index based on the two different values of the cut off, k.

It can be observed from the table that the multidimensional poverty headcount increases with decreasing level of k. This agrees with the findings of [11, 2]. As shown in the table, if the poverty line is taken as (k=3), 63 percent of the male headed households was multidimensionally poor, while as much as 77 percent of the female headed households was multidimensionnally poor. The multidimensional poverty index (MPI) for the male and female headed households were 0.31 and 0.38 respectively. This implies that the female headed households are poorer than the male headed households. On the overall, 66 per cent of the rice farming households was multidimensionally poor. However, if the poverty line is taken as (k=2), more than 80 percent of the male headed households fell below the poverty line and the situation is worse for the female headed households in which all of them (100 percent) fell below the poverty line. The MPI for the male and female headed households were 0.38 and 0.46 respectively. This result corroborates the findings of [25] that more than 60 percent of Nigerians live below the poverty line and that it is more severe in the northern part of the country where this study was carried out. The

multidimensional poverty index (MPI) of the rice farming households was estimated to be 0.32. The result is consistent with the national multidimensional poverty index put at 0.31 (Oxford Poverty and Human Development Initiative 2013).

Table6: Log Likelihood Estimates of the Tobit Regression Model for the Determinants of Multidimensional Poverty

Variable	*Coefficient*	*Std Error*	*t-ratio*
Constant	0.334	0.077	4.40***
Gender	-0.002	0.004	0.51*
Health status	0.026	0.012	2.17**
Level of Education	0.007	0.008	0.91
Marital Status	0.071	0.029	2.45**
Age of Household head	-0.002	0.001	-1.44
Access to Credit	0.034	0.046	0.73
Membership of Association	-0.047	0.027	1.76*
Log likelihood = -11.844397			
Prob > chi2 = 0.0154			

*Significance level **P<0.05, *P<0.10,. Source: Data analysis, 2013*

From the maximum likelihood estimates of the Tobit regression (Table. 21), the results show that the model (regression line) fits the data reasonably. The model had a Pseudo R-squared of 0.69 approximately implying that the observed explanatory variables in the model explained about 69% of the variation in the model. The result showed that gender of the household head, membership of association, health and marital status significantly influences the depth of multidimensional poverty. While marital and health status of the respondents were significant at five percent, gender of the household head and membership of association were found significant at one percent. The coefficient of gender was 0.02. This means that the poverty depth is increased by 0.02 for a household in which the household head is a female. The coefficient of membership of association is 0.047. This implies that the intensity of multidimensional poverty was lower in a household whose head was a member of a cooperative society or any other farmers' association than in one whose head did not belong to such an organization. This might be as a result of various benefits accruable to members of cooperative societies, such as credit facilities, access to improved production inputs and access to information that could enhance their sense of decision. Similar findings were reported by [3, 3, 9]. The coefficient of marital status is 0.071. This means that the poverty depth is increased by 0.071 for a household in which the household head is married. The reason for this could be that married households tend to have a larger household size, which raises the dependency ratio. The coefficient of health status is 0.026. The positive sign implies that households in which the household head fall sick frequently is more likely to be multidimensionally poor.

4. Conclusion and Recommendations

The study concluded that the rice farming households in the study area were multidimensionally poor. The study also showed that the female headed households were more deprived than the male headed households. Gender of the household head, health, marital status and membership of association were identified as the major determinants of multidimensional poverty among the rice farming households in the study area. In line with the results of the study, it was recommended that the government should give priorities to the development of the rural areas with special consideration for women through the provision of essential infrastructural facilities. Also, the government should encourage farmers to form viable cooperative societies, by providing an enabling environment for them to thrive.

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6. Reference

1. Adeolu BA and Taiwo, A: **The impact of National Fadama facility in alleviating rural poverty and enhancing agricultural development in South-Western Nigeria**. *Journal of Social Science* 2004, **9**(3): 157-161
2. Adeoti A and Popoola O: **Determinants of Child Poverty in Rural Nigeria: AMultidimensional Approach** *Global Journal of Human Social Science, Arts and Humanities* 2012, **12**(12): 39-54
3. Amaza PS, Olayemi J K, Adejobi AO, Bila Y. and Iheanacho I: **Baseline Socioeconomic Survey report: Agriculture in Borno State, Nigeria** International Institute of Tropical Agriculture, Ibadan, Nigeria, 2007, pp: 84.
4. Alkire S, Roche JM, Santos ME. and Seth S: **Multidimensional Poverty Index 2011: Brief Methodological Note** Oxford Poverty and Human Development Initiative (OPHI), University of Oxford 2011
5. Alkire S and Foster J: "**Counting and Multidimensional Poverty Measurement**", Oxford Poverty and Human Development Initiative, OPHI, Working Paper 7 2007.
6. Alkire S and Foster J: **Counting and multidimensional poverty measurement,** *Journal of Public Economics* 2011a, **95** (7): 476-487
7. Alkire S and Foster J: **"Understandings and misunderstandings of multidimensional poverty measurement",** *Journal of Economic Inequality* 2011b, **9** (2): 289-314.
8. Alkire S and Santos ME '**Acute Multidimensional Poverty: A New Index for Developing Countries'**, *OPHI Working Paper* 2010, Series, 38. Available at http://hdr.undp.org/en/reports/global/hdr2010/papers/HDRP_2010_11.pdf
9. Asogwa BC Umeh JC and Okwoche VA: **Estimating the Determinants of Poverty Depth among the Peri-Urban Farmers in Nigeria**. *Current Research Journal of Social Sciences* 2012. **4**(3): 201-206.
10. Atkinson, AB, Marlier, T, Nolan, B, and Vandenbroucke, F: **Social indicators: The EU and social inclusion.** Oxford, Oxford University Press 2002.
11. Batana , Y: **'Multidimensional Measurement of poverty in Sub-Saharan Africa'**. Oxford Poverty and Human Development Initiative Oxford University: OPHI Working Paper 13, 2008
12. Bourguignon F and, Chakravarty SR: **The measurement of multidimensional poverty.** *Journal of Economic Inequality* 2003, **1**, 25–49.
13. Chowdhury S, and Squire L: **Setting Weights for Aggregate Indices: An Application to the Commitment to Development Index and Human Development Index.** *Journal of Development Studies,* 2006, **42**:(5), 761-771
14. Cisse B, Arouna BA and Diagne A: **Rice Sector Development Hubs: Overview of Hub Activities and Selected sites in the countries**. A Paper presented at the Africa Rice Science Week and GRiSP-Africa Science Forum, 2012, October, Cotonou, Benin
15. Gaston Y: **Conditions for the most robust poverty comparisons using the Alkire-Foster Family of Measures** *OPHI Working Paper 1* no. 44b 2011.
16. Daramola B: **Government policies and competitiveness of Nigerian rice economy**. Paper presented at the Workshop on Rice Policy and Food Security in Sub-Saharan Africa, Republic of Benin 2006. Retrieved from http://www.nerica.org/workshop/RicePolicy/Biyi/Biyi.D.Nigeria.Paper.pdf
17. Decancq K and Lugo MA: **Setting Weights in Multidimensional indices of wellbeing**, OPHI Working Paper 2008, No.18
18. Federal Office of Statistics: **Gross Domestic Product for Nigeria** 2012, Available at www.nigerianstat.gov.ng
19. International Fund for Agricultural Development (IFAD) 2012**: Enabling the Rural Poor to Overcome Poverty in Nigeria.** Retrieved from http://www.ifad.org/operations/projects/regions/pa/factsheets/ng.pdf
20. Imolehin ED and Wada AC: **Meeting the rice production and consumption demands Nigeria with improved technologies**, FAO Corporate Document Repository, *International Rice Commission Newsletter*. 2000, Retrieved from http://www.fao.org/DOCREP/X7164T/X7164T00.HTM
21. Khan MH: **Rural poverty in developing countries. Finance Development**. The *International Monetary Fund Publications* 2000, **37**(4): 23-36.
22. Kudi TM, Usman I, Akpoko JG and Banta AL: **Analysis of the impact of National Fadama Development Project II (NFDP II) in alleviating poverty among farmers in Giwa Local Government Area of Kaduna State**,

Nigeria Ozean Journal of Applied Sciences 2008, **1**(1), 9 – 15

23. Maasoumi E and Lugo MA **"The Information Basis of Multivariate Poverty Assessments"** in *Quantitative Approaches to Multidimensional Poverty Measurement*, Kakwani and Silber (eds.) Palgrave Macmillan (2008)

24. Mcdonald JF. and Moffit RA: **The use of Tobit analysis,** *Review of Economics and Statisitics*, 1980, **62**:318-320.

25. National Bureau of Statistics (NBS) **Annual socio-economic Report** 2011, http://www.nigerianstat.gov.ng/

26. Nnodim O: **Nigeria spends N365bn yearly on rice importation.** *The Punch Newspapers* 2012, April 22. Retrieved from http://www.punchng.com/business/business-economy/nigeria-spends-n365bn-yearly-on-rice-importation-fg/ on the 18th of August, 2013

27. Oxford Poverty and Human Development Initiative: **Multidimensional Poverty Index (MPI) Data Bank** 2013, OPHI, University of Oxford. Available at www.ophi.org.uk/multidimensional-poverty-index.

28. Rahman T, Mittelhammer RC and Wandschneider P: **Measuring the quality of life across countries: A sensitivity analysis of well-being indices**. *WIDER Research Paper* 2003, www.wider.unu.edu/conference/conference-20032/conference%202003-2 papers/paperspdf/Rahman%20Tauhidur%20250403.pdf.

29. Slottje, D: **Measuring the quality of life across countries**. *The Review of Economics and Statistics*, 1991, **73**(4): 684–693.

30. Umeh JC and Asogwa BC: **Econometric Model of Poverty for the Farming Households in Nigeria: A Simultaneous Equation Approach**. In: Xuan, L., (Ed.), 2nd International Conference on Agricultural and Animal Science (CAAS 2011), Maldives. International Proceedings of Chemical, Biological and Environmental Engineering, 2011, **22** : 82-87.

31. UNDP**: List of African countries by Human Development Index**, United Nations Development Programme's Human Development Report 2010. Retrieved from http://en.wikipedia.org/wiki/List_of_African_countries_by_Human_Development_Index

32. Uzondu J: **Much ado about rice production**. *Nigerian Newsworld* (2011, September, 11), Retrieved 12th January, 2013 from www.nigeriannewsworld.com/content/much-ado-about-rice-production

33. Wikipedia (2013), http://en.wikipedia.org/wiki/Nasarawa_State retreived 31st January, 2013

34. World Bank (2011): **Poverty and Inequality Analysis** worldbank.org