Gender analysis of poverty among rice farming household in Nigeria rice hub

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Abstract

Rice is an important crop to combat poverty; production has not kept pace with demand and gender blindness in policy making is prevalent in Nigeria. The study researched the poverty status of rice farming household, their determinants of poverty. 3-stage stratified random sampling was used; descriptive statistics, Foster Greer and Thorbecke poverty measure and Logitic regression were the analytical tools. The study revealed 23.81% of the respondents are female-headed and 76.19% are male-headed; 54.29% of the women are without formal education as compared to the men 25.89%. The male headed household are poorer 47.32% and 37.14%. The determinants of poverty include rice cultivated area, age, household size, use of credit, area of upland and education level. It is however recommended that gender consideration should be made a priority in poverty reduction strategies among rice farming households; innovation use should be encouraged; and education should be prioritized

Keyword: Gender, Nigeria, Poverty, Rice farming households

1.0   INTRODUCTION

The debate on the relationship between small farms and poverty in Sub-Saharan Africa (SSA) has gone through several cycles (Spencer, 2002; Poulton et al., 2005; Lipton, 2005). Evidence from literature identified this region as one of the world's poorest, and the economies are heavily depended on agriculture as the primary source of income and food. These poor farmers include both males and females who play important role for food security of this region. Nigeria is located in this region; as the eight most populous nation of the world with about 168 million people, (Federal Office of Statistics, 2012) poverty is widespread with an estimated 80 per cent of Nigerians subsisting on less than $2 a day (UNDP 2009). A national poverty survey carried out indicates that the high tropic areas have moderate poverty while the northern regions have poverty levels that are as high as 60% (Okunmadewa et al., 2005; Nigeria Bureau of Statistics, 2009). This situation however, presents a paradox considering the vast human, material and physical resources that the country is endowed with, no noticeable success has been achieved in this direction. Although, predicted poverty reduction scenarios vary greatly depending upon the rate and nature of poverty related policies, actual evidence suggests that the depth and severity of poverty is still at its worst in Nigeria. (Hanmer and Nasehold, 2000; Barbier, 2000; Okunmadewa et al., 2005). Both the

quantitative and qualitative measurements attest to the growing incidence and depth of poverty in the country (Federal Office of Statistics (FOS), 1999; Okunmadewa et al., 2005).

Interestingly, poverty is a rural phenomenon in Nigeria where the people depends on agriculture for survival. These agricultural activities employs both gender, with women playing vital roles in food production, processing and marketing in Nigeria; producing about 60-80 per cent of total output (Rahman, 2004), and contributing about 60-80 per cent of agricultural labour force (Mgbada, 2000). They also contribute more than two-thirds of their produce towards household subsistence (Ayoola, 1999; Rahman, 2004). One of the most important agricultural crops grown by male and female headed household in Nigeria is rice.

Rice is a major crop for poverty reduction in Nigeria, it has emerged as one of the fastest growing agricultural sub-sectors; moved from a ceremonial to a staple food such that some families cannot do without rice in a day (Nwachukwu *et al* 2008). However, the cultivation of rice is not a practice confined to a sex category. Fakoya *et al*. (2010) reported that poor rural women play important roles in rice based farming systems as unpaid family workers, hired labourers, income earners and major caretakers of family health and nutrition; the role which has been overshadowed by gender insensitivity by policy makers (Kandiwa, 2013). There is unequal division of labour and other numerous marginalization and subordination of women; the policy making body has consistently turned blind eye with insensitive and oblivious behaviour on such gendering issues in rice production in Nigeria. With evidence suggesting a continuous gap between supply and demand for rice in Nigeria, it is therefore of importance to have strategy to put men and women's concerns and experiences at the centre of research design, implementation, monitoring, and evaluation so as to reduce poverty (Ayinde *et al*. 2013;). If gender issues bordering on such imbalance in rice production is not addressed, Nigeria cannot achieve its intended aim of poverty eradication among rural rice farming households, it is upon this background that this study seeks to determine the socio-economics characteristics of male headed and female headed rice farming household, the disaggregated poverty profile of rice farming households and the determinants of poverty of these households.

Theoretical Framework
This study is based on the theory of production, which states that, given level of technology and production inputs, an efficient producer will achieve maximum production of outputs. This theory assumed effects of external and internal factors on different households (especially smallholder farmers) in agricultural production (Quisumbing, 1996). A production function is a technical relationship between inputs and outputs that specifies the maximum level of output possible, given input levels. The production function shows the ability of a farm manager to critically consider available production resources, make necessary decisions and produce output, given level of technology (Auma, 2010). As a general preposition; provided technologies and managerial decision making skills are the same, farmers who have identical access to identical factors (both quantity and quality) may produce identical outputs of a given crop which will have overall effect on their income and subsequent poverty status within the economic society. That is, their productivity will be identical. If they use different technologies, or different quantities of these factors, or there is difference in quality of these factors, their productivity will differ. There may be differences in the productivity of male

and female farmers and their income will drop which may also make them sit among the vast majority of the poor. Men and women within the rural African household pursue both on farm and off-farm activities and have different endowments such as land rights and education, and different access to technologies, to factors of production such as labour and capital, and to support services such as extension and credit and their level of decision making differs on productive inputs and other household activities. Such factors affect households engaged in agricultural production differently. Gender of the household head (farm manager) is an internal factor that may hinder achievement of efficiency in agricultural production amongst the smallholder farmers due to decision making ability. Gender is the cultural interpretation of sex which considers socially constructed roles, responsibilities, characteristics, attitudes, and beliefs towards men and women. These roles are defined, supported, and reinforced by societal structures and institutions.

There are two approaches to production function, the primal (direct estimation of production function) and dual approach (indirect estimation of production function through profit or cost function). Most studies on analysis of gender effects on agricultural productivity used primal approach to production function and the application of dual approach is quite recent (Quisumbing, 1995). Primal-approach to production function analyzes and estimates directly the production functions of a farm manager (gender of household head) i in household j

$Y_{ij} = f (V_{ij}, X_{ij}, Z_j)$
Where Y_{ij} is quantity produced,
V_{ij} is a matrix of inputs used by farm manager in household j, including land, labour, capital, and extension advice;
X_{ij} is a matrix of individual attributes, including gender; and
Z_j are household-and community–level variables. Correlation of input use with individual and household characteristics can be captured by interaction terms V_iX_i and V_iZ_j respectively.

The study used the dual approach to production analysis, it estimates profit function as a function of input and output prices, and derives the input demand and output supply functions from the restricted profit function. This approach has its advantages when there are multiple outputs and inputs, as in a multi-crop farming system. Modelling input choice explicitly also allows for the possibility that farmer characteristic influence the decision making process of conventional inputs.

$Y = \alpha_0 L^{\alpha 1} T^{\alpha 2}$

Where Y is output,
L is labour input (hired or family),
T is a matrix of land, capital, and other conventional inputs which include decision making. Usually the equation is estimated by ordinary least squares (OLS) by linearizing the Cobb-Douglas production function:
$\ln Y = \alpha_0 + \alpha_1 \ln L + \alpha_2 \ln T + \beta \ln E + \delta SEX + \varepsilon$
Where Y, L, and T are as defined above;

E is educational attainment or indicator variable for level of schooling (of farm manager, or household head);

SEX is the sex of household head or farm manager; and

ε is error term. The coefficient that indicates gender differences in technical efficiency is δ, an intercept shifter

2.0   METHODOLOGY

2.1   Study Area

The study was carried out in the Nasarawa/Benue rice hub of Nigeria. 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 (Cisse, & Diagne 2012). The rice hub shares in the benefits of the Benue river valley for rice production. 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. 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. Both states share a common boundary and have rich and diverse agricultural produce.

2.2   Sampling

A three-stage stratified random sampling procedure was used for this study. Local extension offices were visited to collect the list of villages and household in each village in the two states (the hub).Villages where rice is not produced or grown was dropped. The remaining list of villages was stratified based on; dominance of rice production. The villages were grouped into two; (rice in the target ecology as major crop; rice in the target ecology as minor crop). This resulted into two strata. In each stratum, eight villages was randomly selected using Microsoft excel worksheet to form a total of sixteen villages. Within these sixteen villages, ten households was randomly selected with a minimum of three household headed by women giving a total one hundred and sixty respondents (160) and at least thirty per cent of women household farmers.

2.3   Source of Data

The study used 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. The Mlax application is designed with such flexibility such that data collected are automatically sent to a cloud server after connecting the tablets to the internet

2.4   Method of Data Analysis

Descriptive Statistics was used to investigate the socio-economic characteristics of male headed and female-headed rice farming household, Foster, Greer and Thorbecke method (income approach) was used to determine the poverty status and logistic regression was used to identify the determinants of poverty among male and female headed rice farming households.

2.5 Model Specification

2.5.1 Foster, Greer and Thorbecke poverty measure (Income approach)

The FGT measure, which measures the absolute poverty as used by Baiyegunhi and Fraser (2010) is expressed as:

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{m} \left(\frac{z - y_i}{z} \right)^\alpha , \alpha \geq 0$$

Where;

Z=Poverty line

m =Number of households below poverty line

n =Number of households in the reference population/total sampled population

y_i= Per adult equivalent income of ith household

α =Poverty aversion parameter

z- y_i =Poverty gap of the ith household

$\frac{z - y_i}{z} =$ Poverty gap ratio

The headcount index was obtained by setting α = 0, α = 1 the yield poverty gap index, and $\alpha = 2$ yield the squared poverty gap index. Standard poverty line of World Bank of 2 USD per day was used (Worldbank, 2013).

2.5.2 Logit Regression Model

The respondents were classified into poor and non-poor using the poverty line. The relative poverty line of $^2/_3$ of mean per capita income will be used. Farmers that have per capital income below the poverty line will be classified as poor and non-poor otherwise. The response variable will be binary taking values of one if the farmer is poor and zero otherwise.

$$Z_i = \ln \left(\frac{P_i}{1-P} \right) = \beta + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_i X_i$$

If the disturbance term (U_i) is taken into account, the Logit Model becomes:

$$Z_i = \beta + \sum_{i=1}^{n} \beta_i X_i + U_i$$

Where;

P_i = probability that a farmer will fall below the poverty line or not given as X_i; (0 = Non-poor; 1 = poor)

β = coefficient of Parameter

U_i = Error term or Disturbance term

X_1 = Rice cultivated area (Ha)

X_2 = Age (Years)

X_3 = Household size

X_4 = Use of Credit (Dummy 1 = Yes, 0 = No)

X_5 = Area of Upland (Ha)

X_6 = Area of Lowland (Count)

X_7 = Access to improved varieties (Dummy 1 = Yes, 0 = No)

X_8 = Primary activities of Household head

X_9 = Education Level

X_{10} = Marital Status (Dummy 1 = Yes, 0 = No)

3.0   RESULTS AND DISCUSSIONS

3.1   *Socio-economic Characteristics of Male-headed and Female-headed rice farming households*

The table (1) shows that 23.81% of the respondents are female-headed and 76.19% are male-headed suggesting that the involvement of women in rice farming in the study area is low despite their potential in contributing to the potential of rice farming in the study area; more than half of the women (54.29%) are without any form of formal education as compared to the men (25.89%). Majority of the male are married (98.21%) and the females are either married or widowed respectively (19%, 16%). More than half of the male (52.68%) and female (68.57%) farmers do not belong to any form of association. The effect of this could mean that they do not have the advantages what groups could offer in term of; training; credits; mobilization of resources; and dissemination of necessary information. On the average the rice area cultivated by both male headed household and female headed household are 3.05Ha and 2.58Ha and the mean household is 9 members for male-headed households and 7 for female-headed households with 49 years and 54 years as the mean age of the male and female household suggesting the female headed house are older.

3.2   *Disaggregated Poverty profile of Male headed and female headed households*

The table (2) shows the poverty status of female headed and male headed rice farming households; Among the female, 37.14% were income poor while 62.86% are non-income poor. Among the male group, 52.68 % are non-poor while 47.32% are poor. The implication of this is that efforts targeted in increasing the income of farmers in an attempt to alleviating poverty among rural farming household is yielding considerable result which also agree with report of the World bank that the poverty profile of Nigeria dropped by 2% in 2013. (World Bank 2013)

Table (3) revealed that the males in the study area (0.47) have more poverty incidence than the female (.37). The depth of poverty also shows poverty affects the males more than the females as shown in the figure 0.18 and 0.09 respectively. Also, poverty is more severe among the male than the females with 0.10 and 0.05 respectively. The study area is a Muslim dominated environment where majority of the women are placed in harem, many males have more than one wife the household members are always large. The provision of the needs of members of the male headed household is taken care of by the male head and this affects their poverty status, the incidence, depth and severity of poverty among them. The female headed household also involve in other income generating activities which also supplements the income of the household. It may also suggest that the female headed household are better managers of little productive resources available at their disposal.

3.3   Disaggregated Determinants of Poverty of rice farming household

Table (4) present the disaggregated poverty determinants of male and female rice farming households, The positive values of the coefficient implies that increasing the independent variables by one unit will increase the poverty level by the value of the coefficient while negative values of the coefficient implies that increasing the independent variable by one unit will reduce the poverty level by the value of the coefficient. Rice cultivated area was

positively significant for the female headed household at 10%, this suggests that increase in rice area will increase the incidence, depth and severity of poverty of the female headed household. This probably means the female headed household may not have the capacity to make use of the available land area if increased by a unit. Increase in land usage will not be favourable, innovation in the use of rice variety and other farming methods with available land resources may be a better option to increase productivity and income. Age is negatively significant for the male headed rice farming household at 1%, it implies a unit increase in age will reduce the poverty by 0.04%. Experience is a function of age, increase in age may suggest an increase in experience and this mean the farmer may become more perfect in the management and use of resources available at his disposal. For the female headed farming household, age was not found as a significant factor determining their poverty, this may suggest the female farmers use more of hired labour or involve in other profitable enterprises such as rice processing which necessarily are not age dependent. Household significant for the male and female headed household at 1% and 10% respectively, a unit increase in the household size will increase the level of poverty by 0.26%. The female headed household however will be more affected by increase in the household size, a unit increase in the household size of the female headed household will increase the poverty by 0.86%. This suggests that large household does not necessary mean high productivity, especially when the increase is an increase in dependency ratio and not active labour. Innovation in rice farming can better be an option to increase the income from productivity instead of increasing the family population. Area of upland been cultivated for rice production is significant for the female headed household head at 10%. An increase in the unit of upland farming practice will reduce the incidence, depth and severity of poverty of the female headed household by 3.57%. Upland rice farming is one of the major innovation in rice farming practices, this suggest also that the female headed household use this innovation than the male headed household which may also be a factor contributing to their lower poverty status as compared to the male headed households. Education level was found significant for the male headed rice farming household at 10% and for the female headed rice farming household at 5%. The negative coefficient suggests that increase in education will reduce the poverty among the male farmers. A unit increase in education level in education will reduce poverty among the farming households by 0.26% and 2.90% for the male and female headed households respectively. This percentage reduction further affirms the level of deprivation of female in education in the study area.

4.0   Conclusion and Recommendation

The study contribute to knowledge by showing that the poverty situation or rice farming household in Nigeria rice hub is against the popular belief that female headed household are poorer; it has been able to show that efforts targeted at reducing poverty among rice farming household in Nigeria is yielding positive result among the female headed households. It is therefore recommended that; gender consideration in policy making in rice production should be a priority among stakeholders with more focus on male headed households; use of rice innovation should be encouraged to increase income and educational effort should be intensified among rice farmers

5.0   Acknowledgement

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Table (I): Socio-Economic Characteristics of rice farming households

Household Head Sex	Frequency	Percentage			
Female	35	23.81			
Male	112	76.19			
Total	**147**	**100**			
Male			**Female**		
Age	**Frequency**	**Percentage**	**Age**	**Frequency**	**Percentage**
≤30	8	7.13	≤30	0	0
31-40	27	24.12	31-40	3	8.57
41-50	31	27.69	41-50	14	40.01
51-60	24	21.44	51-60	12	34.29
61-70	17	15.17	61-70	5	14.3
≥71	5	4.45	≥71	1	2.83
Total	**112**	**100**	**Total**	**35**	**100**
Mean	**49.08929**		**Mean**	**54.17143**	
Std. Dev.	**13.64713**		**Std. Dev.**	**8.678865**	
Membership of Association			**Membership of Association**		
No	59	52.68	No	24	68.57

Yes	53	47.32	Yes	11	31.43
Total	**112**	**100**	**Total**	**35**	**100**
Education Level			**Education Level**		
Junior high school	8	7.14	Junior high school	3	8.57
Literate/Koranic	9	8.04	Literate/Koranic	0	0
None	29	25.89	None	19	54.29
Primary	23	20.54	Primary	6	17.14
Senior high school	24	21.43	Senior high school	4	11.43
Tertiary	19	16.96	Tertiary	3	8.57
Total	**112**	**100**	**Total**	**35**	**100**
Household Size			**Household Size**		
≤5	27	24.1	≤5	12	34.29
6 – 10	50	44.65	6 – 10	17	48.55
11 – 15	28	25	11 – 15	4	11.44
16 -20	6	5.36	16 -20	1	2.86
≥21	1	0.89	≥21	1	2.86
Total	**112**	**100**	**Total**	**35**	**100**
Mean	**8.839286**		**Mean**	**7.257143**	
Std. Dev.	**3.960511**		**Std. Dev.**	**4.513658**	
Rice Cultivated Area			**Rice Area**		
≤2	62	55.36	≤2	21	60
3 – 4	31	27.68	3 – 4	11	31.43
5- 6	8	7.14	5- 6	2	5.71
7-8	5	4.46	7-8	0	0
≥9	6	5.36	≥9	1	2.86
Total	**112**	**100**	**Total**	**35**	**100**
Mean	**3.047411**		**Mean**	**2.577143**	
Std. Dev.	**2.539682**		**Std. Dev.**	**2.11338**	

Source: Field Survey 2013

Table II: Poverty Status of Rice farming Households.

Female				Male		
Poverty Status	**Freq.**	**Percentage**	**Cum.**	**Freq.**	**Percentage**	**Cum.**
Non Poor	22	62.86	62.86	59	52.68	52.68
Poor	13	37.14	100	53	47.32	100
Total	**35**	**100**		**112**	**100**	

Source: Field Survey 2013

Table III: Incidence, Depth and Severity of Poverty among male and female household

Sex of Household head	Sample Size	No of Poor	Incidence	Depth	Severity
Female	35	13	0.371	0.097	0.045
Male	112	53	0.473	0.189	0.099

t-value				0.593	0.273

Source: Field Survey, 2013

Table IV: Disaggregated Logistic Regression Analysis

Logistic regression	Male		Female	
	Number of observation	112	Number of observation	35
	L R chi2(7)	30.2	L R chi2(7)	26.5
	Prob > chi2	0.0008	Prob > chi2	0.0031
	Pseudo R2	0.1949	Pseudo R2	0.5738
	Log likelihood	-62.369998	Log likelihood	-9.8404001
Variables	**Coefficient**	**Std. Err.**	**Coefficient**	**Std. Err.**
Rice Cultivated Area	-0.20635	0.153155	1.951597***	1.113368
Age	-0.04414***	0.023472	-0.16682	0.13744
Household size	0.262879*	0.076494	0.856459***	0.499569
Use of Credit	1.437098**	0.721056	-1.66089	1.710787
Area of Upland	0.077885	0.214722	-3.56838***	2.103992
Area of Lowland	0.035963	0.10647	-2.21437	1.517455
Access to improve variety	-0.1603	0.689374	8.265784	5.102342
Household head primary activity	-0.35071	0.267263	4.626186	3.449514
Education level	-0.2623***	0.154733	-2.90027**	1.323366
Marital Status	0.158894	1.716822	-4.95787	3.591135
_cons	-1.67824	4.001613	13.56818	15.0698

Source: Field Survey, 2013

Table (5) Marginal Effect analysis

Male			Female	
Poverty Status	**dy/dx**	**Delta Method Std. Err.**	**dy/dx**	**Delta Method Std. Err.**
rice12	-0.039	0.028116	0.174**	0.077393
agem	-0.008**	0.004201	-0.015	0.01077
hhsize	0.050*	0.011537	0.077**	0.035931
obtain	0.271**	0.127604	-0.148	0.143636
areaupl	0.015	0.040479	-0.319**	0.147498
arealowl	0.007	0.020079	-0.198***	0.116592

accerimpr	-0.030	0.130064	0.738***	0.378054
pryact	-0.066	0.049236	0.413	0.27322
edulevel	-0.050***	0.027842	-0.259*	0.073374
marstatus	0.030	0.324241	-0.4429	0.276289

Source: Field Survey, 2013