

## **Determinants of Poverty among Rice Farming Households in Nigeria: A Gender Analysis**

**Oluwafemi Olajide Ajewole<sup>1,3</sup>, Vet Ojehomon<sup>2</sup>, Opeyemi Eyitayo Ayinde<sup>1</sup>,  
Rita Afiavi Agboh-Noameshie<sup>3</sup>, Florent M. Kinkinginhoun-Medagbe<sup>3</sup>**

<sup>1</sup>Department of Agricultural Economics and Farm Management,  
University of Ilorin, Kwara State, Nigeria

<sup>2</sup>National Cereals Research Institute (NCRI) Badeggi, Bida, Niger State, Nigeria

<sup>3</sup>Gender Task force Unit, Africa Rice Centre, Cotonou, Benin Republic

Corresponding author: Oluwafemi Olajide Ajewole,  
email: [serapholuwaferanmi@gmail.com](mailto:serapholuwaferanmi@gmail.com)

### **Abstract**

Rice is an important crop to combat poverty but production has not kept pace with demand. Moreover, gender blindness in policy making is prevalent in Nigeria. The study looked into the poverty status of rice farming households and the determinants of poverty. Three-stage stratified random sampling was used. Descriptive statistics, Foster Greer and Thorbecke poverty measure, and logistic regression were the analytical tools. The study revealed that 23.81% of the households are female-headed and 76.19% are male-headed; 54.29% of the women are without formal education as compared to the men, with 25.89%. The male-headed households are poorer than the female-headed. The results of this study have relevance to policy implications.

**Keywords:** credit, crop, education, policy, production

## **Introduction**

The debate on the relationship between small farms and poverty in Sub-Saharan Africa (SSA) has gone through several cycles (Spencer, 2001; Lipton, 2006; Poulton et al., 2010). Evidence from literature identified this region as one of the world's poorest, and the economies are heavily dependent on agriculture as the primary source of income and food. These poor farmers include both men and women who play important role in food security of this region. Nigeria is the eighth most populous nation of the world with about 168 million people [Federal Office of Statistics, (FOS), 2012] and poverty is widespread with an estimated 80 per cent of Nigerians subsisting less than \$2 a day (United Nations Development Program, 2009). A national poverty survey 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 but 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 et al., 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 (FOS, 1999; Okunmadewa et al., 2005).

Interestingly, poverty is a rural phenomenon in Nigeria where the people depend on agriculture for survival. These agricultural activities employ both men and women, with women playing vital roles in food production, processing, and marketing. Women produce about 60-80 per cent of the total output (Rahman et al., 2004) and contribute to about 60-80 per cent of the agricultural labor force (Mgbada, 2000). They also contribute more than two-thirds of their produce towards household subsistence (Ayoola, 1999; Rahman, 2004). One of the major crops produced in Nigeria is rice. This crop has emerged as one of the fastest

growing agricultural sub-sectors, being moved from a ceremonial to a staple food such that some families cannot do without rice in a day (Nwachukwu et al., 2008; Awotide et al., 2016). Literature reports that 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 laborers, income-earners, and major caretakers of family health and nutrition, the role which has been overshadowed by gender insensitivity by policy makers (Kandiwa, 2013).

Despite the involvement of these rural women, there is unequal division of labor and other numerous marginalization and subordination. The policy making body has consistently turned a blind eye with insensitive and oblivious behavior on such gender 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 a strategy to put the concerns and experiences of men and women at the center of research design, implementation, monitoring, and evaluation so as to reduce poverty which has been reported to have a feminine face (Ayinde et al., 2013). If gender issues bordering on such imbalance in rice production are not addressed, Nigeria cannot achieve its intended aim of poverty eradication among rural rice farming households. In order to end rural poverty among rice farming households, it is important to investigate the socioeconomic characteristics of rice farming households, the disaggregated poverty profile of rice farming households and the determinants of poverty of these households from a gender angle to ascertain the possible existing differences.

## **Materials and Methods**

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 et al., 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 Lafía and Obi local government areas in Nasarawa state. Benue State is located within longitude  $7^{\circ}47'$  and  $10^{\circ}0'$  East and Latitude  $6^{\circ}25'$  and  $8^{\circ}8'$  North while Nasarawa state is located within  $8^{\circ}32'$  and  $8.533^{\circ}$  North and  $8^{\circ}18'$  and  $8.3^{\circ}$  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.

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 were dropped. The remaining list of villages was stratified based on the dominance of rice production. The villages were grouped into two (rice in the target ecology as major crop and rice in the target ecology as minor crop). The grouping resulted into two strata. In each stratum, eight villages were randomly selected using microsoft excel worksheet to form a total of 16 villages. Within these 16 villages, 10 households were randomly selected with a minimum of three households headed by women giving a total of 160 respondents and at least 30% of women household farmers. The study used primary data from the Africa Rice baseline survey.

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

***Foster, Greer and Thorbecke (FGT) poverty measure (Income approach)***

The FGT measure which determines 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  $Z$  is poverty line,  $m$  is the number of households below poverty line,  $n$  is the number of households in the reference population/total sampled population,  $y_i$  is per adult equivalent income of  $i^{th}$  household,  $\alpha$  is poverty aversion parameter,  $z - y_i$  is the poverty gap of the  $i^{th}$  household, and  $\frac{z - y_i}{z}$  = poverty gap ratio. The headcount index was obtained by setting  $\alpha = 0$ ,  $\alpha = 1$  the yield poverty gap index, and  $\alpha = 2$  the yield squared poverty gap index. Standard poverty line of World Bank of 2 USD per day was used (World Bank, 2013).

***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 was used. Farmers that have per capital income below the poverty line were classified as poor and non-poor otherwise. The response variable is binary taking values of one if the farmer is poor and zero otherwise.

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

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  $P_i$  is probability that a farmer will fall below the poverty line or not given as  $X_i$  (0 = Non-poor; 1 = poor),  $\beta$  is the coefficient of parameter,  $U_i$  is the error term or disturbance term,  $X_1$  is the area of rice cultivated land (Ha),  $X_2$  is age (years),  $X_3$  is the household size,  $X_4$  is use of credit (Dummy 1 = Yes, 0 = No),  $X_5$  is the area of land (Ha),  $X_6$  is the area of lowland (Count),  $X_7$  is access to improved varieties (Dummy 1 = Yes, 0 = No),  $X_8$  is primary activities of household head,  $X_9$  is education level, and  $X_{10}$  is marital status (Dummy 1 = Yes, 0 = No).

## **Results and Discussion**

### ***Socioeconomic characteristics of male-headed and female-headed rice farming households***

Table 1 shows the socioeconomic characteristics of male- and female-headed rice farming households. The farming households in the area are male-dominated. Similar result is shown in other states in Nigeria (Afolami et al., 2012; Awotide et al., 2016). Married women within their reproductive age may have been constrained by their participation in rice-farming as a result of marital responsibilities as well as the cultural and religious practices of *Prudah*. In Nigeria, mostly in Northern areas, *Prudah* is a custom of women seclusion that limits freedom of women to engage in farming and other income-generating activities (Dauda et al., 2009). The finding agrees with the study of Ayoola et al. (2011) in Northern Guinea Savanna of Nigeria.

**Table 1. Socioeconomic characteristics of rice farming households.**

Characteristics	Gender			
	Male (N=112)		Female (N=35)	
	Frequency	Percentage	Frequency	Percentage
<b>Age (years)</b>				
≤30	8	7.13	0	0
31-40	27	24.12	3	8.57
41-50	31	27.69	14	40.01
51-60	24	21.44	12	34.29
61-70	17	15.17	5	14.3
≥71	5	4.45	1	2.83
Total	112	100	35	100
Mean	49.01		54.21	
Std. Dev.	13.64		8.77	
<b>Membership of Association</b>				
No	59	52.68	24	68.57
Yes	53	47.32	11	31.43
Total	112	100	35	100
<b>Education Level</b>				
None	29	25.89	19	54.29
Primary	23	20.54	6	17.14
Literate/Koranic	9	8.04	0	0
Junior high school	8	7.14	3	8.57
Senior high school	24	21.43	4	11.43
Tertiary	19	16.96	3	8.57
Total	112	100	35	100
<b>Household Size</b>				
≤5	27	24.1	12	34.29
6 – 10	50	44.65	17	48.55
11 – 15	28	25	4	11.44
16 -20	6	5.36	1	2.86
≥21	1	0.89	1	2.86
Total	112	100	35	100
Mean	8.84		7.32	
Std. Dev.	3.96		4.51	
<b>Rice Cultivated Area (ha)</b>				
≤2	62	55.36	21	60
3 – 4	31	27.68	11	31.43
5- 6	8	7.14	2	5.71
7-8	5	4.46	0	0
≥9	6	5.36	1	2.86
Total	112	100	35	100
Mean	3.05		2.58	
Std. Dev.	2.54		2.11	

Source: Field Survey, 2013

In this study, women farmers were older than men. Despite variation in age across gender, the result indicates that farmers are within the agricultural production age. The findings are also similar with the results of previous studies in other places in Nigeria showing that rice farmers are within their active labor age (Okeke et al., 2012; Adamu & Bakari, 2015). However, women farmers may have less vigor for farming than men taking into account their age. Ayoola et al. (2011) emphasized that older rice farmers have less vigor than the younger farmers. Hence, age becomes one of the major determinants of poverty of farmers (Adenuga et al., 2015).

Majority of the rice farmers in this study did not belong to any form of association. The result may imply that the farmers have less access to some benefits from organizations in terms of training, credits, mobilization of resources, and dissemination of necessary information. Formation of associations among rice farmers in rural areas should be encouraged for them to have access to improved farming technologies and rice varieties (Muhammad et al., 2014; Awotide et al., 2016). Membership to any organizations may increase participation of rice farmers to trainings that show a positive and significant impact to the income of rice farmers in North Central, Nigeria (Tsado et al., 2014). Making training then as the topmost priority for rice farmers may improve their skills on the adoption of improved rice technologies to increase production and consequently the income for poverty reduction.

More women farmers did not possess any form of formal education compared to men. The result is not similar with the findings in other states where majority of the rice farmers have access to formal education (Afolami et al., 2012; Okeke et al., 2012; Maurice et al., 2015). The implication of low literacy among rice farmers, particularly the women, may pose limitations to acquiring technical skills and decision-making capacity (Oladeji et al., 2015). In a study in other states in Nigeria, rice farmers with high literacy earn a higher profit than those with low education level (Adamu & Bakari, 2015). Hence, educational level of the household head is regarded as one of the major determinants of poverty among rice farmers in a state in Nigeria (Adenuga et al., 2015).

Majority of the men farmers are married (98.21%) and the women are either married (19%) or widowed (16%). The mean size of male-headed households was higher compared to female-headed households. Household size is among the major determinants of poverty in other states in Nigeria (Adenuga et al., 2015). Despite variation in household sizes, rice farmers who have children tend to establish a permanent residence in the area and continue to engage in rice farming as the main livelihood (Annor-Frempong et al., 2010).

The average rice area cultivated by both male-headed and female-headed households were 3.05 ha and 2.58 ha, respectively. Farm size may also help reduce poverty since large farm size increases profit efficiency as crop output is increased (Nmadu & Garba, 2013; Maurice et al., 2015). Adamu & Bakari (2015) found out in their study that a 10% increase in farm size increases farm profit by 11% with other factors held constant. In this study, rice farms are considered small despite variation in farm sizes (Odu & Okoruwa, 2013).

### ***Disaggregated poverty profile of male-headed and female-headed households***

The poverty status of male-headed and female-headed rice farming households is shown in Table 2. Among the male-headed households, 47.32% were poor while 37.14% of the female-headed households were income-poor. The implication of result is that efforts targeted in increasing the income of farmers in an attempt to alleviate poverty among rural farming households are yielding considerable result. The reduction in poverty also agrees with the report of the World Bank that the poverty profile of Nigeria dropped by 2% in 2013 (World Bank, 2013). Rice farming has been a profitable business for women in Nigeria (Fonjong & Athanasia, 2007). Women can hire both male and female workers for their rice plots. Women could be pushed into rice production taking into account that most of them are married with large households and they are not also sufficiently literate to find well-paid jobs. In developing countries where agriculture is the main livelihood, most poor people have no skills other than the manual labor to do farming (Rehman et al., 2016).

The result is not similar with the finding in Nairobi, Kenya wherein female-headed households are more disadvantaged relative to male-headed families (Mberu et al., 2014). In Malawi, Africa, results of the analysis of the gender gap in agricultural productivity showed that female-managed farmlands are less productive (Kilic et al., 2015). Some women farmers in rice growing areas have been able to use modern technology to augment their production but majority of the women still cannot afford the technology such as tractors, animal traction, and power tillers (Fonjong & Athanasia, 2007). Further, the study of Karamba and Winters (2015) suggests that the female-headed households also face additional constraints to agricultural productivity apart from the nonlabor input use. However, in a previous study in Africa, gender-based income gaps were absent in 17 of the regions suggesting that neither poverty nor growth in general discriminates against female-headed households (Djurfeldt et al., 2013).

**Table 2. Poverty status of rice farming households.**

Poverty Status	Male			Female		
	Frequency	%	Cum.	Frequency	Percentage	Cum.
Non-Poor	59	52.68	52.68	22	62.86	62.86
Poor	53	47.32	100	13	37.14	100
<b>Total</b>	<b>112</b>	<b>100</b>		<b>35</b>	<b>100</b>	

Source: Field Survey, 2013

Table 3 reveals that poverty incidence is higher among male-headed households in the study area. The depth of poverty is also more pronounced in male-headed households. Similarly, poverty is more severe among the male-headed households than among the female-headed households. The study area is dominated by the Muslims where majority of the women are placed in harem with many men having more than one wife and the household members are always large. The needs of the members of the male-headed household are being taken care of by the male head which affects the poverty status, incidence, depth, and severity of poverty.

The female-headed households are also involved in other income generating activities which also supplement the income of the household. Women farmers carry out other subsistence activities such as farming other crops, petty trading, poultry, and livestock production (Fonjong & Athanasia, 2007). The findings may also suggest that the female-headed households are better managers of little productive resources available at their disposal.

**Table 3. Incidence, depth, and severity of poverty among male-headed and female-headed households.**

Sex of Household head	Sample Size	No of Poor	Incidence	Depth	Severity
Male	112	53	0.473	0.189	0.099
Female	35	13	0.371	0.097	0.045
t-value				0.593	0.273

Source: Field Survey, 2013

***Disaggregated determinants of poverty of rice farming households***

Table 4 presents the disaggregated poverty determinants of male and female rice farming households. The positive values of the coefficient imply 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 imply 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 households at the 10% level. The result suggests that an increase in rice cultivated area will increase the incidence, depth, and severity of poverty of the female-headed household. The result implies that the female-headed households may not have the absorptive capacity to make use of the available land area if increased by a unit. Increase in land usage will not be favorable. 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.

**Table 4. Disaggregated logistic regression analysis.**

Logistic regression	Male		Female	
	Number of observations	112	Number of observations	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 cultivated	0.077885	0.214722	-3.56838***	2.103992
Area of lowland cultivated	0.035963	0.10647	-2.21437	1.517455
Access to improved varieties	-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

Legend: \*\*\* Significant at the 1% level

    \*\* Significant at the 5% level

    \* Significant at the 10% level

Age is negatively significant for the male-headed rice farming households at the 1% level. The result implies that a year increase in age will reduce the poverty by 0.04%. Experience is a function of age such that an increase in age may lead to an increase in experience which may cause the farmer to be better in the management and use of resources available at his disposal. For the female-headed farming households, age was not found as a significant factor determining poverty. The result

may suggest that female farmers use more hired labor or they are involved in other profitable enterprises such as rice processing which are not age-dependent.

Household size is significant for both male- and female-headed household at 1% and 10%, respectively. An additional member in the household will increase the level of poverty by 0.26% in male-headed households. The female-headed household, however, will be more affected by an increase in the household size such that an additional member in the household will increase the poverty by 0.86%. This suggests that a large household does not necessarily mean high productivity, especially when the increase is an increase in dependency ratio and not active labor. Innovation in rice farming can be a better option to increase the income from productivity.

As shown in the result, more use of credit could increase poverty level in male-headed households. This result does not support the claim of Chandio et al. (2017) that access to agricultural credit can increase productivity, thereby reducing poverty. The male farmers may not have invested the amount borrowed on their farming activities.

Area of upland cultivated for rice production is significant for the female-headed household at 10%. An increase in the unit of upland rice farming 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 innovations in rice farming practices which suggests also that the female-headed households use this innovation than 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 a year increase in education will reduce the poverty among the male and female-headed farming households by 0.26% and 2.90%, respectively. The higher percentage reduction in poverty among female-headed households affirms the higher level of deprivation of women in education in the study area.

## **Conclusion and Recommendations**

The rice farming households in Nasarawa and Benue states in Nigeria that are male-headed have greater incidence, depth, and severity of poverty than the female-headed households. The determinants of poverty which include the rice cultivated area, age of farmers, household size, use of credit, area of upland cultivated, and education level differ with gender. Household size and education are significant determinants for both gender but vary as to their effect. Rice cultivated area, age of farmers, use of credit, and area of upland cultivated are significant determinants of poverty to only one gender with effects that also vary. It is therefore recommended that gender consideration in policy making in rice production should be a priority among stakeholders. Use of rice farming innovation should be encouraged to increase income and educational effort should be intensified among the rice farmers.

## **Acknowledgment**

The Authors are grateful to Africa Rice Centre Cotonou, Benin Republic for funding this research; Department of Agricultural Economics and Farm Management, University of Ilorin, Kwara, State; and Nigeria and National Cereals Research Institute, Badeggi, Nigeria for providing the technical support.

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