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Role of Rural Women in Farm Management Decision Making Process: Ordered Probit Analysis

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Abstract: Rural women play a significant role in domestic and socio-economic life of the society such that national development is not possible without developing this important and substantial segment of our society. Considering therefore, the importance of women in agriculture, this study was conducted to examine the role of women in farm management decision-making process. Data were collected in 10 areas of decision making, keeping in mind their importance for agricultural development. The Ordered Probit Model was employed in addition to the descriptive statististics to analyze the data. It was discovered that the socio-economic characteristics of the women farmers significantly affect their decision making in agriculture.

Key words: Ordered robit · rural women · decision-making · farm management

INTRODUCTION

The role of women in agricultural production in Nigeria can never be overemphasized. They perform crucial roles in the domestic and economic life of the society. Rural and national developments can hardly be achieved with the neglect of this important and substantial segment of the society [1]. In recognition of the important role of women in nation building, the Nigerian Government more than ever before is keen upon rural poverty alleviation as a way of improving the economy. As such, focus is on planned and desirable change in the rural societies in the form of agricultural development. The success of these planned change programmes is however hinged largely on the rational decision aking process of the women. A lot of literatures [2-6] have shown the various contributions of women to agricultural production in Nigeria. The role of women in decision- making process in agriculture has however not widely been explored. Male dominance in decision making in the household and economy has continued even in areas where women are the key providers of labour because the influence of women has not been recognized. The women have more or less been relegated to play second fiddle in homes and the economy. There is therefore the need to correct for this anomaly.

Considering therefore the importance of rural women in agricultural production, this study was conducted in Zaria area of Kaduna State to examine the level of participation of rural women in the decision-making in different areas of agriculture and to study the factors influencing their participation in the decision-making process in farm management.

MATERIALS AND METHODS

The study was conducted in Chikum and Igabi Local Government Areas of Kaduna State. A double stage random sampling was employed in obtaining the sample for the study. Four villages were randomly selected out of which 50 women were selected randomly from each village to form the sample size. A total of 200 women were therefore randomly selected for the study. The data were collected for the 2005/ 2006 cropping season with the aid of structured questionnaire. The information gathered includes age, level of education, religion, wealth status and size of land holding. Furthermore, 10 areas of decision-making were also examined in this study to determine the role of rural women in decision making process in agriculture; bearing in mind their importance for agricultural production and development. The level of participation of women in agriculture was analysed by studying the responses on a three point scale:

- whether the women farmers were only consulted
- whether their opinions were also considered and
- their involvement in taking final decision.

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Simple descriptive statistics and the ordered Probit model were used in the analysis.

Model specification: Since the dependent variables of main interest, factors that determine women participation in farm management decision making had an ordinal categorical nature, the ordered Probit model was employed for the analysis of the polychotomous response data. Considering the ordinal Probit model, let:

$$Y^* = \beta' X_i + \varepsilon_i$$

Where; Y* is the underlying latent variable that indexes the level of participation of the woman in a given farm operation, X_i is a vector of parameters to be estimated and ϵ_i is the stochastic error term. The latent variable exhibits itself in ordinal categories, which could be coded as 0, 1, 2, 3, ...…, k. The response of category k is thus observed when the underlying continuous response falls in the *k*-th interval as:

$$\begin{aligned} Y^* &= 0 \quad if \quad Y^* \le \delta_0 \\ Y^* &= 1 \quad if \quad \delta_0 < Y^* \le \delta_1 \\ Y^* &= 2 \quad if \quad \delta_1 < Y^* \le \delta_2 \\ Y^* &= 3 \quad if \quad \delta_2 < Y^* \le \delta_3 \end{aligned}$$

Where δ_1(i=0,1,2,3) are the unobservable threshold parameters that will be estimated together with other parameters in the model. When an intercept coefficient is included in the model, δ_0 is normalized to a zero value [6] and hence only k-1 additional parameters are estimated with βs. The probabilities for each of the observed ordinal response which in this study had 10 responses (0, 1, 2, 3) will be given as:

$$\begin{aligned} prob(Y=0) &= P(Y^* \le 0) = P(\beta' X + \varepsilon_i \le 0) = \phi(-\beta' X) \\ prob(Y=1) &= \phi(\delta_1 - \beta' X) - \phi(-\beta' X) \\ prob(Y=2) &= \phi(\delta_2 - \beta' X) - \phi(\delta_1 - \beta' X) \\ prob(Y=3) &= 1 - \phi(\delta_2 - \beta' X) \end{aligned}$$

where $0<\delta_1<\delta_2<...<\delta_{k-1}$ ϕ is the cumulative normal distribution function such that the sum total of the above probabilities is equal to one. The marginal effects of the regressors X on the probabilities are not equal to the coefficients. The marginal probabilities could therefore be calculated from the Probit model as:

$$\frac{dprob[Y_k]}{dX_k} = \left[\phi(\delta_{k-1} - \beta' X_k) - \phi(\delta_k - \beta' X_k)\right]\beta$$

Table 1: Description of explanatory variables used in the participation model

Variable Name	Description
AGE: <21	Respondent's aged below 21 years. Value 1; 0 otherwise
AGE: 21-35	Respondent's aged between 21-35 years. Value 1; 0 otherwise
AGE: 36-50	Respondent's aged between 36-50 years. Value 1; 0 otherwise
AGE: >50	Respondent's aged above 50 years. Value 1; 0 otherwise
EDU	Value 1 if respondent had primary education; 2 if secondary education, 3 if tertiary education and 0 otherwise
REL	Value 1 if a Muslim, 2 if a Christian and 0 otherwise
WELSTA	This refers to the disposable income of the woman is measured in naira.
TENANCY	Value 1 if tenant operated; 0 otherwise.

where ϕ(.) is the normal density function, δ_k the threshold parameter and X_k the k-the explanatory variable. The marginal effect was computed directly from the SHAZAM software employed in the analysis of this study. The list of variables used in the main empirical model is given on Table 1. The dependent variable indexes if the level of participation of the woman is low, medium or high. The value is 1 if low, 2 if medium, 3 if high and 0 otherwise.

The explanatory variables employed in the Probit regression model are defined in Table 1. The first three are dummy variables that account for the level of education, religion and the wealth status of the women. Size of land holding was measured in hectares. The age of the women is split into various groups to examine the role of age groups in women participation in farm decision making.

RESULTS AND DISCUSSION

The data regarding the extent of participation of women in the various areas of farm decision making process is presented in Table 2. The participation of the women in decision making was quite minimal. Table 2 reveals that in each of the farm operations, less than 20% of the women were consulted, except in the sourcing of farm credit where about 28% were consulted; about 13% or less of the women had their opinion considered in each of the farm operations except in storage and marketing where about 46% had their opinion considered. However, only between 1 and 2.5% took the final decision in all of the farm operations.

The extent of women participation in farm management decision making process depends on a number of factors. Table 3 shows the maximum likelihood estimates of the parameters of Probit regression model characterising the role of women participation in farm

Table 2: Extent of the participation of women in decision making in agriculture

Decision making areas	Nil	Only consulted	Opinion considered	Final decision
Land preparation	176 (88.0)	21 (10.5)	3 (1.5)	0 (0.0)
Time of sowing	156 (78.0)	34 (17.0)	8 (40.0)	2 (1.0)
Manure/ fertilizer types and time of application	162 (81.0)	19 (9.5)	15 (7.5)	4 (2.0)
Time of weeding	189 (94.5)	9 (4.5)	2 (1.0)	0 (0.0)
Number of hired labourers and wages to be paid	135 (67.5)	39 (19.5)	17 (18.5)	9 (4.5)
Time of harvesting	111 (55.5)	37 (18.5)	49 (14.5)	3 (1.5)
Storage and marketing of farm produce	28 (11.5)	37 (18.5)	92 (46.0)	48 (24.0)
Purchase and sale of farming implements	156 (73.0)	29 (14.5)	13 (6.5)	2 (1.0)
Purchase and sale of farmlands	161 (80.5)	23 (11.5)	11 (5.5)	5 (2.5)
Farm credit	117 (58.5)	57 (28.5)	26 (13.0)	0 (0.0)

*Figures in parenthesis are the percentages.

Table 3: The maximum likelihood estimates of the probit model

Parmeter	Coefficient	T-value
Constant	8.386*	2.895
AGE: <21	-2.079	-1.203
AGE: 21-35	-2.117	-1.175
AGE: 36-50	2.876*	1.890
AGE: >50	1.248*	2.987
LEDU	1.623*	3.111
REL	1.949	1.341
WELSTA	2.017*	2.752
TENANCY	2.568**	3.876

*Sig at p<.05, *Sig at p<0.001, LR test: 49.81, Madalla R^2: 0.68, Mcfadden R^2: 0.7, Percentage of correct predictions: 98

management decision making. 98 percent of the women farmers were correctly classified by the model. The log-likelihood ratio test showed that the estimated model with the set of explanatory variables for the data was better compared with the null model. There was therefore a significant relationship between the log of odds {ln [P/(1-P)]}and the probability of the level of women involvement in farm management decision-making and the explanatory variables included in the model. This is suggestive of the fact that these variables contribute significantly as a group to the explanation of the role of women in decision-making in agriculture. The Madalla and Mcfadden R^2 prove the goodness of the model used in the analysis.

Based on the Probit model analysis, the age group, education, wealth status and tenancy variables were found to have significant influence on the level of women participation in farm management decision making. The negative signs on age groups with ages 35 years and below and the positive signs on the age groups variables with ages 36 years and above imply that the level of participation of the women in farm management decision making increases with age: This therefore suggests that the age of the woman farmer is an important variable influencing the involvement of the woman in farm management decision making. However, only the 36-50 and >50 age groups were significant at the 5% level. Hence older women participated more in decision making process in the different areas of agriculture than their younger age group counterparts. The significantly positive sign on the LEDU variable might be attributed to the high level of knowledge and experience about improved farm practices acquired by the educated woman farmer. This helps her to influence major decisions being taken in the home, farm management inclusive.

The wealth status of the woman is also a major determinant of the role of the woman in farm management decision making. The more financially strong the woman is, the more her involvement decision making process.

In regards to tenancy, the significant positive sign implies that landless women do not make significant participation in farm management decision making. The landless woman undertook farming on leased land and could not as such take a major decision that has to do with the land without the owner's consent.

Lastly religion was found not to have any significant influence on the level of the woman's participation in farm management decision making. This might be due to the second fiddle position the woman is forced to play [7] in the country irrespective of her religion.

CONCLUSIONS

It can therefore be concluded that though the woman farmer is heavily involved in agriculture in Nigeria, the level of her participation in farm management decision making is quite low. This can be attributed to the age, education, land tenancy and the wealth status of the

woman. Majority of the women interviewed were however found not to be formally educated and are of the low income group.

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