DETERMINANTS OF LEVEL OF PARTICIPATION IN CASSAVA PROCESSING: A GENDER SITUATION ANALYSES AMONG FARMERS IN IMO STATE NIGERIA

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Abstract

The socioeconomic determinants of level of participation by male and female farmers in cassava processing in Imo State Nigeria were investigated in this study. Purposive and multi-stage random sampling techniques were used to select 240 respondents comprising 120 males and 120 females in this study. Data collection was by means of a set of structured questionnaires. Tobit regression was used to analyze the data generated because level of participation ranged from zero to infinity. Results obtained showed that for male respondents, the significant regression coefficients were level of education (3.89, significant at 5.0%); household size (13.28, significant at 10.0%); farm size ((51.75 significant at 5.0%); monthly income from cassava business (0.0008 significant at 5.0%) and membership of cooperative societies (57.51 significant at 10.0%). The same regression coefficients were also significant for female respondents at the following levels: level of education (5.616, 5.0%); household size (1.593, 5.0%); farm size (61.29, 5.0%); monthly income from cassava business (0.0001, 10.0%) and membership of cooperative societies (12.61, 5.0% level). Based on these findings, level of education, household size, farm size, monthly income from cassava business and membership of cooperative societies were the determinants of the level of participation of the respondents in cassava processing among both groups of respondents in the study area. The results therefore call for policies aimed to provision of free and affordable education to enable farmer's ability to access and process information on processing innovations that will enhance participation in processing activities. There is also need for re-distribution of land to make more land available to farmers for increased production which is expected to enhance participation in cassava processing. Encouraging farmers to belong to cooperatives is expected to enhance economies of scale for enhanced production and processing of cassava.

Keywords: Education, farm size, income, and membership of cooperatives, and male and female processors

Introduction

Nigeria is the world's largest producer of cassava with an estimated production put at about 57.1 million metric tonnes in 2016 (FAOSTAT, 2018). Cassava is an important food and cash crop for many rural households in Imo State. As a cash crop, cassava generates cash income for the largest number of households in comparison with other staples (Adeniji *et al*., 2000). Freshly harvested cassava roots have varying amounts of potentially toxic cyanogens (Cardoso *et al*., 2005; CIAT 2007). They also have a short shelf-life usually not more than 72hrs due to post-harvest physiological deterioration (Yimala *et al*., 2014). Consequently freshly harvested cassava roots must be processed into non-toxic and more stable forms within a short time to avoid loss, thus making processing a critical component of the cassava value chain. Both men and women participate in cassava processing operations (Amadi, 2018). However, their levels or intensity of participation vary with specific operations (Amadi, *ibid*). Women dominate in most processing operations (peeling,

sieving, toasting, fermenting, cooking, pounding and wrapping of pounded cassava), while men dominate in grating and dewatering because they operated the machines used for these operations (Amadi and Ezeh, 2018).

Participation in agricultural production by rural dwellers is influenced by their socio-economic characteristics. Age (Nandi *et al*., 2011) and years of farming experience (Udoh and Falake, 2006) affects productivity and participation. Farmers within the age range of 30-59 were found to be more productive than farmers who were 60 years and above because they are still active and very energetic, while farmers with more years of farming experience had higher farm outputs than those with little or no experience. Amanze *et al*. (2010) reported that the level of education of a farmer not only increases his productivity, but also enhances his ability to understand and evaluate new production techniques. Farm size contributed positively to cassava farming as indicated by the report of Okike (2006); that cultivation of larger hectare of land leads to increase in

cassava output. A study by Okoh (2008) revealed that small-scale farmers are constrained when accessing credit from the formal credit sources due to their lack of tangible assets to use as collateral for credit, inadequate knowledge about formal credit availability and long loan-processing time of financial institutions. The objective of the study is to ascertain the socio-economic determinants of the level of participation of male and female farmers in cassava processing in Imo state Nigeria.

Methodology
The study was carried out in Imo State Nigeria. The state lies within latitudes 4°45'N and 7°15'N of the Equator and longitudes 6°50'E and 7°25'E of the Greenish Meridian with an area of 5,100 sq km. (NPC, 2006). Purposive and multi-stage sampling technique was used in selecting two hundred and forty (240) cassava farmers with equal number of males and females. A structured questionnaire was used to elicit primary data; including socio-economic characteristics of respondents, quantity of roots produced and processed. To model the determinants of level of participation in cassava processing among the respondents in the study area, a Tobit model was used. This model (Chow, 1983, Maddala 1983) has found several empirical applications in literature (Holloway *et al*., 2004; Nkamleu, 2007). The dependent variable is level of participation in cassava processing, which was censored at zero because some respondents actually were not engaged in processing (indicating that the dependent variable ranged between 0 to infinity). To avoid the censoring bias that Ordinary Least Squares could generate, a Tobit censored at zero was used because level of processing smaller than zero was not observed. Since the level of participation in cassava processing cannot be negative (the threshold is zero) and the value of the Log likelihood function is given as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}) + e$$

Where;
Y= Level of participation in cassava processing (0 - ∞),
X_1 = Age (years),
X_2 = Education level (years spent in school),
X_3 = Occupational status (dummy variable, 1=full time farming, 0=otherwise),
X_4 = Marital status (dummy variable; 1= married, 0=otherwise),
X_5 = Household size (number of persons),
X_6 = Farm size (hectare).
X_7 = Distance to processing centre (km),
X_8 = Quantity of roots produced (kg),
X_9 = Monthly income from cassava business (N),
X_{10} = Farming experience (years),
X_{11} = Membership of cooperative society,
e = error term.
Quantity of roots processed (kg) was used as a proxy for level of participation.

Results and Discussion
Determinants of Level of Participation in Cassava Processing among Male Respondents
Tobit regression coefficients for the determinants of level of participation among male respondents in cassava processing are presented in Table 1. The model posted a Log likelihood of -591.867, Pseudo R^2 = 0.0322 and chi^2 = 39.39, indicating the goodness of fit of the regression line. Five independent variables were statistically significant at different levels indicating that they were important determinants of level of participation in cassava processing. These variables include: education, household size, farm size, monthly income from cassava business and membership of cooperative societies. The coefficient of education (3.89) was positive and significant at 5.0% level. This implies that for male farmers the probability and intensity of participation in processing increased with increasing number of years spent in school. Adeyemo *et al*., (2010) noted that education improves the efficiency of farmers to access improved technologies and select the best available ones, thereby increasing their level of output. Coefficient of household size (13.28) was positive and significant at 10.0% level, implying that increase in family size led to an increase in the probability and intensity of participation among male respondents in cassava processing. This conforms to expectation. The coefficient (51.75) of farm size was positive and significant at 5.0% level. This implies that any increase in farm size will lead to a corresponding increase in the probability and intensity of participation in cassava processing among the male farmers in the study area. Increased farm size ensured a surplus of harvested roots which had to be processed to avoid the usually rapid post-harvest physiological deteriorations that affects freshly harvested cassava roots. The coefficient (0.0008) of monthly income from cassava business was positive and significant at 5.0% level; implying increase in income from cassava business will lead to a corresponding increase in probability and intensity of cassava processing among male farmers in the study area. This finding is in conformity to expectation as increasing income from any activity is an incentive for respondents to increase their level of participation. Production and processing activities require money. Accordingly, increased farm income will increase the tendency of the respondents to be involved in the activities (Onyemauwa, 2012). The coefficient for membership of cooperatives (57.51) was positive and significant at 10.0% level. This implies that any increase in membership of cooperatives among the male processors will lead to a corresponding increase in probability and intensity of participation in cassava production. This result is consistent with the findings of Lagat and Maina (2017) who noted that benefits inherent in group membership such as access to inputs at reduced price due to bulk purchase, subsidized transport and improved credit access as they guarantee each other, expectedly, increased men's involvement in cassava on-farm processing activities.

Table 1: Tobit regression estimates of determinants of the level of participation in cassava processing among male farmers in Imo State

Variable	Coefficient	t-value
Constant	-88.267	-1.02
Age (X_1)	0.474	0.36
Education (X_2)	3.888	2.67**
Occupation (X_3)	1.240	0.04
Marital status (X_4)	-48.717	-1.35
Household size (X_5)	13.275	1.99*
Farm size (X_6)	51.749	2.76**
Distance to processing centre (X_7)	-1.859	-0.62
Quantity of roots produced (X_8)	0.020	0.19
Income from cassava business (X_9)	0.0008	2.69**
Experience (X_{10})	-0.231	-0.15
Membership of cooperative society (X_{11})	57.506	1.90*
Log likelihood	-591.867	
Pseudo R2	0.0322	
LR chi2(11)	39.39***	
Number of observations	120	

Determinants of Level of Participation in Cassava Processing among Female Respondents

Tobit regression coefficients for the determinants of level of participation among female respondents in cassava processing are presented in Table 2. The model posted a Log likelihood of -720.949, Pseudo R^2 = 0.421 and chi^2 = 39.39, indicating the goodness of fit of the regression lines. Five independent variables that determined levels of participation of female respondents in cassava processing were education (5.616), household size (1.593), farm size (61.29) monthly income from cassava business (0.0001) and membership of cooperative societies (12.61). The coefficient of education was positive and significant at 5.0% level. This implies that the probability and intensity of participation of female respondents in cassava processing increased with increasing number of years spent in school. In other words, the higher the educational status of female respondents, the more actively they participated in cassava processing. Bamidele *et al*. (2008) noted that when farmers are educated, they would appreciate improved technologies and even use them appropriately in order to enhance their output of cassava. Coefficient of household size was also positive and significant at 5.0% level, implying that increase in household size enhanced female respondents' probability and intensity of participation in cassava processing. This conforms to expectation. The coefficient of farm size was positive and significant at 5.0% level. This implies that increasing farm size among female respondents enhanced their probability and intensity of participating in cassava processing. The coefficient of income from cassava business was positive at 10.0% level implying increase in monthly income from cassava business led female respondents to increase their probability and intensity of participation

in cassava processing. This finding is in conformity with the report of Onyemauwa, (2012), who noted that since production and processing activities require money, increased farm income will increase the tendency of the women to be involved in the activities. However, Damisa *et al*. (2007) reported a negative and significant relationship between level of income and women participation in agricultural production, implying an inverse relationship with the level of participation of the women in agricultural production and explained that this unexpected relationship could possibly be due to the risk and uncertainty associated with agricultural production, such that women with high disposable income level would prefer to diversify their resource base in less risky investments than to be fully embedded in agriculture. The probability and intensity of participation of female respondents in cassava processing increased with increase in their membership of cooperative societies. This can be deduced from the positive coefficient which was significant at 10.0% level. This finding is in agreement with the reports of Nze *et al*. (2017) and Kalu *et al*. (2016). The benefits inherent in cooperative membership enable the farmers to access their inputs at reduced price due to bulk purchase and subsidy given by various institutional bodies from time to time (Onyemauwa, 2012). Expectedly, cooperative membership increased the tendency of the farmers to be involved in cassava processing activities. Unfortunately, many of the female respondents in this study did not belong to cooperative societies and as Onyemauwa, (2012) pointed out, most agricultural technology is provided to farmers who belong and take part in cooperative activities. Their non participation in cooperative activities will likely constrain their processing activities.

Table 2: Tobit regression estimates of determinants of the level of participation in cassava processing among female farmers in Imo State

Variable	Coefficient	t value
Constant	19.575	0.25
Age (X_1)	0.907	0.81
Education (X_2)	5.616	2.45**
Occupation (X_3)	5.612	0.21
Marital status (X_4)	20.340	0.65
Household size (X_5)	1.593	2.63**
Farm size (X_6)	61.289	3.44**
Distance to processing centre (X_7)	9.727	1.52
Quantity of roots produced (X_8)	-0.025	-0.30
Income from cassava business (X_9)	0.0001	1.90*
Experience (X_{10})	-0.068	-0.04
Membership of cooperative society (X_{11})	12.609	2.10*
Log likelihood	*-720.94897*	
Pseudo R2	*0.4213*	
LR chi2(11)	*31.35**	
Number of observation	*120*	

*Source STAT 13; ***, ** and * Significant at 1%, 5% and 10% level respectively*

Conclusion

Based on the findings in this study, level of education, household size, farm size, monthly income from cassava business and membership of cooperative societies were the determinants of the level of participation of the respondents in cassava processing. The results therefore call for policies aimed to provision of free and affordable education to enable farmer's ability to access and process information on processing innovations that will enhance participation in processing activities. There is also need for re-distribution of land to make more land available to farmers for increased production which is expected to enhance participation in cassava processing. Encouraging farmers to belong to cooperatives is expected to enhance economies of scale for enhanced production and processing of cassava.

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