

EFFECT OF MARKET PARTICIPATION ON FOOD SECURITY AMONG SMALLHOLDER SORGHUM FARMERS IN KWARA STATE, NIGERIA

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ABSTRACT. It is paradoxical to note that food insecurity remains a menace among many African farmers' households. There are arguments for and against smallholder farmers' market participation as a pathway for ensuring household food security. The paper therefore examined the market participation- food security relationship using smallholder sorghum farmers in Kwara State, as a case study. Primary data were obtained from 112 sorghum farming households using the semi-structured interview survey method. Descriptive statistic (frequencies and percentages), Crop output market participation index, Logistic regression model and Tobit regression model was used to analyse the data obtained. The result revealed that market participation positively and significantly contributes to the food security status of the sorghum farmers. Also, household size, farm output quantity, access to market information, access to credit and farm power types were the factors influencing the level of

market participation in the study area. Therefore, all factors that will aid farmers' market participation should be pursued.

Keywords: food insecurity; tobit regression; farm output; credit.

INTRODUCTION

Agriculture is an occupation that is intimately linked with food security, health, and nutrition through direct consumption and market linkages (Poole, 2017). However, in spite of the close relationship between agriculture and nutrition, most of the undernourished people in the world are smallholder farmers (Frelat *et al.*, 2016). Agricultural pathways, such as crop diversity and market participation, have been identified to be beneficial for improving food security among smallholder farmers.

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The main crops planted are sorghum, maize, cassava, groundnut, soybean, wheat, sweet potato, cowpea, yam, pepper, and vegetables. The state is divided into four agro ecological zones by the Kwara State Agricultural Development Project (Zone A, B, C, D). The study relies on the Food and Agriculture Organization (FAO) definition of small holder farmers. Smallholders are small-scale farmers, pastoralists, forest keepers, fishers, who manage areas varying from less than 1 ha to 10 ha.

Sampling technique

A four-stage sampling technique was used in the study. The first stage involved the random selection of two ADP zones (C & D) from the four ADP zones of Kwara State. Second was the random selection of one local government area (LGA) from each of the two zones. The local government areas selected were Ifelodun and Ilorin East LGAs. The third stage was the random selection of four villages from each LGA. At the last stage, a snowballing technique was used to generate a list of smallholder sorghum farmers in each of the selected villages; 14 smallholder sorghum farming households were then randomly selected from each of the eight selected villages making a total of 112 farming households.

$$Y_{it} = \beta_0 + \beta_1 MP_{it} + \beta_2 X_2 + \beta_3 X_{it} + \mu_{it} \quad i = 1, \dots, N$$

β_0 = Intercept; β_{it} = Regression coefficient; Y_{it} = The food security status of household; X_1 = Age of the household head (years); X_2 = Gender of the household head (1 if male and 0 if otherwise); X_3 = Years of schooling; X_4 = Household size (Number of household members); X_5 = Farm size in hectares; X_6 = Quantity produced (kg); X_7 = Access

Source of data

Primary data was collected with the aid of a semi structured interview in the farmers' local language. This is because most of the farmers have little or no years of formal education.

Analytical technique

The study used the market participation index, as used by Demeke and Haji (2014) to classify the farmers into high, medium and low levels of commercialization. The index is expressed as follows:

$$MP_{it} = \frac{\sum P_k S_{ik}}{\sum P_k Q_{ik}}$$

where, S_{ik} is the quantity of output k sold by household i , evaluated at an average community price P_k Q_{ik} is the total value of output k produced by household i ; $crop$ output market participation level (MP_{it}).

Crop output market participation (MP_{it}) was grouped into three levels: 1. Subsistence farmers (value of the sale is less than 25%); 2. Transition farmers (value of sale between 25% - 50%); 3. Commercial farmers (value of sale greater than 50%). Following the methodology of Oluwatayo and Rachoene (2017), the logistic regression model was used to analyse the effect of market participation on the food security status of the smallholder sorghum farmers in the study area.

to market information (yes = 1, no = 0); X_8 = Off farm income (Naira); X_9 = Access to credit (yes = 1, no = 0); X_{10} = Distance to the main market (km); X_{11} = Ownership of transport equipment (yes = 1, no = 0); X_{12} = Farm power type (Mechanized = 1, otherwise = 0); X_{13} = Crop output market participation level (<25% = low, 26-50% = medium, >50%

MARKET PARTICIPATION – FOOD SECURITY NEXUS

= High); μ_{it} = Error term, where, Y_{it} is the food security status of household i at time t , and MP_{it} is the crop output market participation level; X_{it} is the characteristics of the farming household observed and μ_{it} . The study relied on daily energy consumption/adult male equivalent

$$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_i X_i + \mu_i \quad i = 1, \dots, N$$

$$Y = 0 \text{ if } y \leq 0, y = Y^* \text{ if } y > 0.$$

Y^* = crop output market participation index; β = estimated parameter or coefficient; X_i = the explanatory variables; μ_i = error term and is normally distributed with zero mean and constant variance; X_1 = Age of the household head (years); X_2 = Gender of the household head (1 if male and 0 otherwise); X_3 = Years of schooling; X_4 = Household size (Number of household members); X_5 = Farm size in hectares; X_6 = Quantity produced (kg); X_7 = Access to market information (yes = 1, no = 0); X_8 = Off-farm income (Naira); X_9 = Access to credit (yes= 1, no = 0); X_{10} = Distance to the main market (km); X_{11} = Ownership of transport equipment (yes = 1, no = 0); X_{12} = Farm power type (Mechanized = 1, otherwise = 0).

RESULTS AND DISCUSSION

The estimates of the levels of participation were used to classify the sorghum farmers into low, medium and high commercial farmers. *Table 1* shows that most (52.68) of the sorghum farmers were found to highly commercialize, while farmers that have a low and medium level of crop output market participation constitute 16.96% and 30.36%, respectively. This implies that the level of crop output market participation is high among the smallholder sorghum farmers.

to assess the food security status (Y_{it}) households observed.

Tobit model was used to analyse the factors that influenced crop output market participation level among sorghum farmers in the study area.

Table 1 - Crop output market participation level of sorghum farmers

Level	Percentage (n=112)
Low (<25%)	16.96
Medium (26% - 50%)	30.36
High (>50%)	52.68
Total	100

Source: Field survey

From the result of the logistic regression statistic in *Table 2*, the gender of the household head is found to have a negative relationship with food security. This implies that the female headed households were more food secured than their male headed counterparts. Also, the level of crop output market participation has a positive and significant relationship with household daily calorie consumption at 5%, which implies that market participation of sorghum farmers tends to foster household food security. This implies that the higher the level of crop output market participation level, the higher the level of food security of the smallholder sorghum farmer. This contradicts Oluwatayo and Rachoene (2017), who assessed the effect of level of crop commercialization on food

security in South Africa and found it to be negatively significant to food security at 5%.

Household size was also found to be negatively significant at all levels. This implies that the larger the household size, the lesser the tendency

of the household being food secured. This is in tune with prior expectations, as research as established a negative relationship between household size and food security.

Table 2 - Effect of crop output market participation level on the food security status of farmers

Variables	Coefficients	Standard error	Z
Age of household head	0.0228402	0.0247108	0.92
Gender of the household head	-1.90444**	0.9667746	-1.97
Years of schooling	-0.0601861	0.0584024	-1.03
Household size	-0.3392041***	0.1156818	-2.93
Farm size	-1.251259	0.7184771	-1.74
Output quantity	0.0002753	0.0002347	1.17
Access market information	-0.8432886	0.6832836	-1.23
Off farm income	-7.09e-06	9.17e-06	-0.77
Access to credit	0.4699395	0.5358007	0.88
Distance to market (km)	-0.0562584	0.029727	-1.89
Transportation (ownership of transportation assets)	0.6427257	0.5772307	1.11
Farm power type			
Level of market participation	-0.0966582	0.3194899	-0.30
Constant	0.0328986**	0.0145318	2.26
Number of obs. = 112	2.739164	1.91011	1.43
Log likelihood = -55.138345			
Pseudo R ² = 0.2729			

Source: Field survey: at 1%***; at 5%**

As shown in the *Table 3*, the result from the Tobit regression model revealed that household size significantly (at 5%) and negatively affects market participation. This implies that the larger a farmer's household size, the lower his tendency of involvement in market participation. This is probably because a larger household requires more quantity of food for survival than smaller households. This would negatively affect the quantity of food output available for participating in the

market. However, this contradicts my expectations and Abdullah *et al.* (2017), who suggested that large household size increases output commercialization because of the advantage of family labour. Besides, output quantity was found to be positively significant at 1%. This conforms to *a priori* expectation. According to Abdullah *et al.* (2017), higher output increases the marketable surplus and thereby increases the intensity of market participation.

MARKET PARTICIPATION – FOOD SECURITY NEXUS

The result also revealed that access to market information positively and significantly (at 1%) affects market participation. This which means that sorghum farmers, who have access to market information in the study area, tend to engage more in crop output market participation. Access to credit was positively significant at 5%. This implies that access to credit by

sorghum farmers aids easy access to farm inputs to produce a marketable surplus. Farm power type was also found to be positively significant at 5%, this is probably because about 56% of the farmers utilize draught and tractors to plough their land. Farmers that make use of draught and tractor are more likely to produce larger marketable surplus than those that are human labour dependent.

Table 3 - Determinants of crop output market participation by the sorghum farmers

Variables	Coefficients	Standard error	t	P> t
Age household head	-0.2786104	0.1784567	-1.56	0.122
Gender of the household head	5.473923	6.534986	0.84	0.404
Year of schooling	-0.523541	0.4225965	-1.24	0.218
Household size	-1.208268**	0.4871939	2.48	0.015
Farm size	3.714107	3.174948	1.17	0.245
Output quantity (kg)	0.006814***	0.000068	4.94	0.000
Access to market information	19.73274 ***	4.966485	3.97	0.000
Off farm income	0.0000256	0.000068	0.38	0.708
Access to credit	8.368604**	3.84787	2.17	0.032
Distance to market	-0.1159539	0.2161936	-0.54	0.593
Transportation (ownership of transportation assets)	0.760702	3.97767	0.19	0.849
Farm power type	4.791925**	2.201403	2.18	0.032
Constant	28.22488	13.54047	2.08	0.040
Sigma	17.93277	1.269413		
Number of obs =112				
LR chi2(12) = 81.32				
Prob > chi2 = 0.000				

Source: Field survey; at 1%***; at 5%**

CONCLUSION AND RECOMMENDATION

The study revealed that market participation is positively and significantly linked to household food security among small holder sorghum farmers in Kwara State, Nigeria.

Hence, the higher the level of crop output market participation, the better the food security level of the smallholder sorghum farmers. It is therefore recommended that efforts that will result in increased market participation among smallholder

sorghum farmers should be put in place by all relevant stakeholders.

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