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Determinants of Farmers' Participation Decision in Groundnut Commercialization: The Case of Babile District, Oromia National Regional State, Ethiopia

Oromia Megersa Gelana*[1], Chanyalew Seyoum[2]
[1]Fedis Agricultural Research Centre, Oromia Agricultural Research Institute
POB 904 Harar, Ethiopia
[2] Department of Rural Development and Agricultural Extension, Haramaya University.
*Corresponding author email: oromiyamegersa2015@gmail.com

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ABSTRACT: *This study was conducted in Babile district to examine the determinants of farmers' participation decision in groundnut commercialization. Cross sectional research design was used. Two stage random sampling procedures were used for the selection of 160 representative sample households. Number of sample size was determined from each 4 representative kebele after Yamane formula was used to determine the total sample size. Probability proportional to size was used to avoid under representation of any one group. Semi- structured interview schedule was used for gathering primary data. Descriptive statistics and probit model were used for data analysis. The probit model result reveals that age, education level, distance to the nearest market, land size, access to market information and non/off-farm income were significantly influence households' participation decision in groundnut commercialization. The findings have an implication for all the concerned body and they should have to develop strategies to address the above-mentioned factors in order to improve smallholder farmers' groundnut commercialization decision.*

KEY WORDS*:* farmers, groundnut, commercialization decision, probit model, Babile district

INTRODUCTION

The agriculture sector is dominated by smallholder farming in Ethiopia. Smallholder agriculture represents about 95% of the total agricultural output. In addition to producing staple crops, smallholders produce large share of export potential crops (FAOSTAT, 2014). Groundnut (Arachis hypogaea, L.), is one of the world's principal oil seed crops, which originated from South America, and is now widely cultivated throughout the tropical, sub-tropical and the warm temperate climatic zones (Sogut et al., 2016). The lowland areas of Ethiopia have immense potential for groundnut production.

The estimated production area and yield of groundnut in the country during 2016/2017 cropping season were 74,861.4 ha and 129,636.4 tonnes, respectively, and the largest production areas are in Oromia (41,055.3 ha), Benshangul-Gumuz (19,729.0 ha) and Amhara (7,104.4 ha) (CSA, 2017).Its production is expanding and has a huge potential as a cash and food crop to improve the livelihoods of farmers and traders in Ethiopia (Daniel, 2009). Groundnut ranked third in Ethiopia after Sesame and Nuge

The total land coverage of groundnut in Ethiopia is 84,237.01 ha and the production is estimated to be 144,091.26 tons with productivity of 1.71 tons per hectare (CSA, 2019).It is an important crop from the perspective of food and nutrition security of poor smallholder farmers in developing countries (Nedumaran, 2015). It also generates considerable cash income for small scale producers and foreign exchange earnings through export for Ethiopia (Geleta *et al.,* 2007).

Eastern lowland areas of Ethiopia particularly Babile, Fedis, and Gursum are the major producers of groundnut for household consumption and income generation (Chala *et al*., 2013).Commercializing smallholder agriculture is seen as a means to bring the welfare benefits of market-based exchange economies and central to an inclusive development process (Arias *et al*., 2013). Commercialization of agriculture is the strategy that the Ethiopian government is following to bring a dynamic change by transforming the traditional agriculture of smallholder farmers (Afework and Endrias, 2016). Groundnut provides dietary nutrients and income for humans, and protein rich fodder for livestock (Chinma *et al*., 2014). Groundnut seed is a rich food source providing quality vegetable oil (48%-50%), protein (26%-28%), dietary fiber, minerals, and vitamins that are essential for the health of the livelihood (Pasupuleti *et al*., 2013).

In many parts of the country, market participation of smallholder family farms are limited and agricultural markets are fragmented and not well integrated into wider market systems, which increases transaction costs and reduces farmers' incentive to produce for market (Mitku, 2014).With the ever-increasing population and the limited farm land, improving rural incomes will require transformation of the subsistence, low-input and productivity farming systems to agricultural commercialization. Its ultimate purpose is poverty alleviation and economic development through income growth. However, it has not been possible to achieve the desired effect of commercialization in subsistence agriculture because farmers' market participation is not motivated by profit-maximizing behavior (Barrett, 2008). They are still involved in local and regional markets and often do not have sufficient surplus production.

Various researches were conducted on groundnut production flow and little attention given for groundnut commercialization (Addisu and Erimias, 2017).There is knowledge gap on the determinant factors influencing the groundnut commercialization in the study area. The aim of this study is to identify factors determining farmers' participation decision in groundnut commercialization in the study area.

RESEARCH METHODOLOGY

Description of the Study Area

Babile is one of the district of Eastern Hararghe zone. It is located to 557 km from Addis Ababa and 35 km from Harar town. The district is bordered with Somali region, in South, Fedis in East and Harari in West and Gursum in North. The altitude of the district ranges from 989-1700 m.a.s. Agro-ecologically, 95% of the district is lowland while the remaining 5% is mid-altitude. The annual rainfall ranges from 410 to 800ml. The mean annual temperature of the area ranges between 24-28°C as information gathered from district in 2019. Based on (CSA, 2008) the district has an estimated population of 99,379 of which 50,025 are male and 49,354 are female. Mixed farming is the major livelihood activity in the area. Sorghum, Groundnut, Maize and Sesame are major crops produced in the area. Groundnut is one of the major oil crops grown in the district for income generation and consumption.

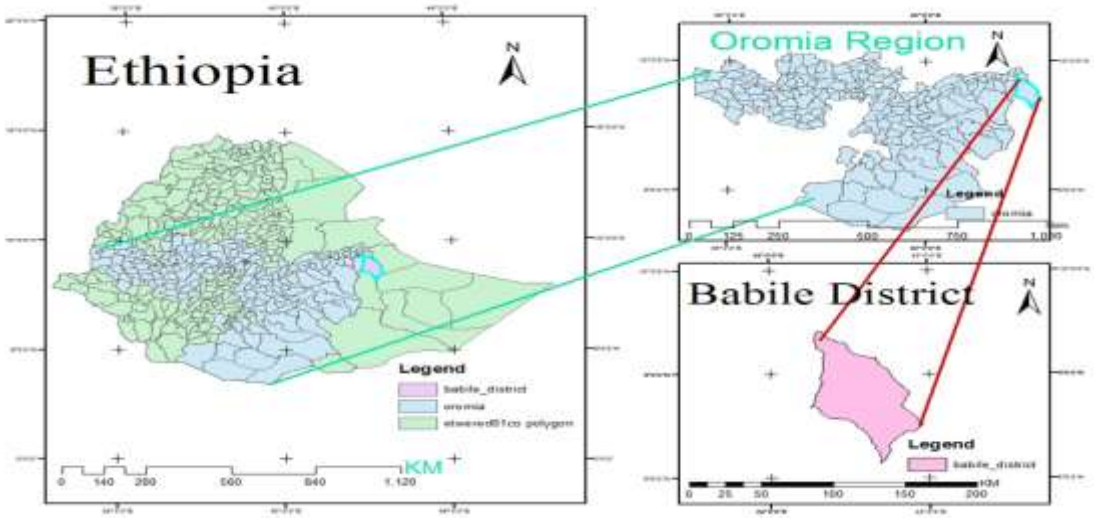

Figure 1. Map of the study area

Research Design

This research work was based on survey from randomly selected sample groundnut producers. Data were collected from sample respondents at one moment of time. Household survey was used so as to achieve the objective of the study.

Sampling Procedures and Sample Size Determination

Babile district was selected purposively based on groundnut production potential. Two stage random sampling procedures were used for the selection of representative sample households. In the 1st stage, 4 groundnut producer kebeles were selected from all groundnut producer kebeles through random sampling. In the 2nd stage, 160 sample households were selected randomly from sampling frame of 2,422 groundnut producing households. This was determined by using Yamane formula（Yamane, 1967).

$$n = \frac{N}{1+N(e^2)} \quad (1)$$

Where: n = sample size of groundnut producer households, N = groundnut producer household heads and e = level of precision (at 7.6%). Sampling error (0.076) is considering the budget limitation and time utilization for the research study. Using probability proportional to size (PPS), number of sample size was determined from each representative kebele to avoid under representation of any one group.

$$n_i = \frac{nN_i}{\Sigma N} \quad (2)$$

Where, n_i = number of sample size from each kebele, n=sample size determined (160), N_i= number of groundnut producer household head of each kebele, N=target population.

Table 1.Randomly selected kebeles and number of sample size determined by PPS

No	selected kebeles	Groundnut producer	sample determined by PPS
1	Remeta Selama	707	47
2	Barkale	604	40
3	Ifadin	506	33
4	Tula	605	40
Total		2,422	160

Source**:** own computation based on secondary data source

Data Types, Sources and Collection Methods

Quantitative data were gathered from primary and secondary sources. Quantitative primary data were mainly focused on socio-economic and demographic characteristics, institutional factors and infrastructural facility related issues. The primary data source was sample farm household heads. Primary data were collected from randomly selected groundnut producers' using a cross-sectional survey method through semi-structured interview schedule. In addition, primary data were collected from focus group and key informant through focus group discussion and key informant interview as methodology respectively. Secondary data sources were collected from Babile district bureau of agriculture and natural resource, CSA and Journals by reviewing.

Methods of Data Analysis

Descriptive statistics and probit model were used for data analysis. Descriptive statistics was used to summarize and categorize the information gathered. Chi-square test (χ^2- test) was used for categorical variables to compare group proportions. The t-test was employed to compare group mean difference for continuous variables.

Econometric model specification

Probit model was used. The decisions are modeled in the following manner:

The probit model is used to determine the farm households' commercialization decision and its specification is given: $y* = x_i\beta + \varepsilon_i N(0,1)$ (4)

$y_i = 1$ if $y* > 0$, 0 otherwise where, $y*$ is a latent variable representing households' binary decision; x_i is a vector of independent variables hypothesized to affect households decision in the commercialization; β is vector of parameters to be estimated by the model. ε_i is a normally distributed error term,; y_i is a discrete response variable.

RESULTS AND DISCUSSION

Descriptive Statistics Results

Demographic and socio-economic characteristics of sample households

Of the total sample respondents, 87.5% were male-headed households while the remaining 12.5% were female- headed household (Table, 3). Of the total sample male-headed households, 74.4% participated in marketing their produce while 11.25% of female-headed household participated in marketing their groundnut produce. The mean age of sample household head was 37 years (Table, 2). The mean age of household head for participant in commercialization and non-participant was 36.09 and 42.35 years respectively. There was significance mean difference between participant and non-participant at 1% significance level in terms of age in year. The mean education level of household head in

formal schooling was 2.28 years (Table, 2). The mean educational level of household head for participants in commercialization and non-participant was 2.44 and 1.35 year in formal schooling respectively. There was significance mean difference between participant and non-participant at 10% significance level in terms of formal education in year.

The mean household size in adult equivalent was 5.11(Table, 2). The mean household size for participant in commercialization and non-participant was 4.99 and 5.78 in adult equivalent respectively. There was statistically significance mean difference between participant and non-participant at 10% significance level in terms of household size in adult equivalent. The mean livestock owned in tropical livestock unit (TLU) was 3.23. The mean livestock owned in tropical livestock unit for participants in commercialization and non-participants were 3.34 and 2.62 respectively. The number of livestock holding in TLU between participant and non-participant was almost similar. The mean land size of household heads in hectare was 1.16. The mean land holding size of household heads for participants in commercialization and non-participants was 1.19 and 0.87 in ha respectively. The mean income generated from non/off-farm activities in thousand birr was 3.44.

Variables	Participants n=137		Non- participant n=23		Total n=160		t-value
	Mean	Std.dev.	Mean	Std.dev.	Mean	Std.dev.	
Age of HH	36.09	10.07	42.35	8.99	37	10.14	-3.04***
Education HH	2.44	2.93	1.35	1.53	2.28	2.79	1.743*
Household SZ	4.99	1.84	5.78	1.73	5.11	1.84	-2.014*
Dntm	1.54	1.04	1.99	1.14	1.6	1.06	-1.776*
LVST	3.34	3.39	2.62	3.6	3.23	3.42	0.886
Land SZ	1.19	0.61	0.87	0.2	1.16	1.14	2.49**
Extn.con.	3.99	4.66	2.57	3.27	3.78	4.51	1.8*
NOFI	3.04	6.59	5.78	5.78	3.44	6.53	-2.06**
Credit	0.88	2.76	0.15	0.42	0.77	2.57	1.27

Table 2. Descriptive statistics result for Continuous explanatory variable Source: own survey result, 2019

Note *** ($p<0.01$), ** ($p<0.05$) and *($p<0.1$) significant at 1%, 5% and 10%, respectively

The mean income generated from non/off-farm activities by household heads for participants in commercialization and non-participants was 3.04 and 5.78 in thousand birr respectively.

Institutional factors

About 62.5% of the sample household had access to market information while 37.5% of the sample respondents had no access to market information in the study area (Table, 3). The major sources of market information for the household heads in the study area are neighboring farmers, development agents and traders. However, there is variation in access to market information from the aforementioned sources between participants in commercialization and non-participants. There was significance proportional difference between participant and non-participant at 1% significance level in terms of access to market information. The mean frequency of extension contact in a year was 3.78 days (Table, 2). The mean frequency of extension contact provided for household heads for participant in commercialization and non-participant was 3.99 and 2.57 in days respectively. There was statistically significance mean difference between participant and non-participant at 1% significance level in terms of frequency of contact in a year. The mean credit received by the sample households' was 0.77 in thousand birr.

The mean credit received by participant household in commercialization and non-participant was 0.88 and 0.15 in thousand birr respectively.

Infrastructural (road) facility

The mean distance to the nearest market in walking hour was 1.6 while the mean distance for participants and non-participant in commercialization was 1.54 and 1.99 respectively (table, 2).

Table 3. Descriptive statistics results for dummy explanatory variables

Variables	Participant in commercialization		Non-participant in commercialization		Total		χ^2_{value}
	N	%	N	%	N	%	
Sex of HH							
Male	119	74.4	21	13.1	140	87.5	
female	18	11.25	2	1.25	20	12.5	0.355
Acc.mrktinfn							
Yes	94	58.75	6	3.75	100	62.5	
No	43	26.88	17	10.625	60	37.5	15.2***

Source: own survey result, 2019

Note: ***, represents significance at 1%

Results of the Econometric Model

One of the rule of thumb to detect high multicollinearity problem is using variance inflation factor (VIF) for continuous explanatory variables while Tetrachoric correlations was used for dummy variables. The mean VIF was 1.2 which indicates no serious problem of

multicollinearity among the continuous variables in the model. Tetrachoric correlations for dummy variables less than 0.75 is appropriate. Breusch-Pagan/Cook-Weisberg test was employed to detect the heteroscedasticity problem. Box plot graph was used to test for the extreme values of continuous explanatory variables. There was no serious problems of extreme values in the data and no dropped out data as extreme values.

Determinants of farmers' participation decision in groundnut commercialization

The probit regression model results shows that the function of participation decision in groundnut commercialization was highly significant at 1% significance level (Prob > chi^2 = 0.0000) suggesting the model has a strong explanatory power of independent variables to explain factors determining commercialization decision of households.

Out of the 11 explanatory variables used in the probit model, six variables: age of household heads, education level of household heads, distance to the nearest market, land size, access to market information and income generated from non/off-farm activities were found to significantly influences the farmers participation decision in groundnut commercialization in the study area (Table, 4).

Age of household heads (Age of HH): The result shows that age has negative effect on the farmers' participation decision in groundnut commercialization at 1% significance level (Table, 4). The marginal effect after probit indicated that as age of household head increases by 1 year, it decreases the farmers' participation decision in groundnut commercialization by 0.11% keeping all other factors constant. This shows that involving active labor force in agricultural activities increases the probability of participation decision in groundnut commercialization. Furthermore, older household takes the low profit with low risk rather than taking high profit with high risk. This result is consistent with the finding of (Edosa, 2018) that age has negative effect in market participation decision.

Education level of household head (Education HH): It had negative and significant influences on the farmer's participation decision in commercialization of groundnut at 5% significance level (Table, 4). This indicates that attending formal education may create other job opportunities to participate in non-agricultural activities as employee. Marginal effect indicated that for each additional year in formal education, the farmer's participation decision in commercialization decreases by 0.18% holding all other factors constant. This result is contrast with the finding of （Christopher *et al*., 2014) that education level influence farmers' participation decision positively.

Distance to the nearest market (Dntm): Was negatively and significantly influences the farmer's participation decision in commercialization at 1% significance level (Table, 4). Marginal effect of this variable revealed that a unit incremental in walking hour decreases the probability of farmer's participation decision in groundnut commercialization by 0.97% keeping all other factors constant. This implies that long time taken to cover distance to the nearest market required high transaction costs or high cost of doing business like transportation costs and personal expenses that decrease farmers' participation decision. This finding is consistent with the finding of (Tufa *et al.,* 2014).

Land holding size (Land SZ): It was found to have positive and significant influences on the participation decision in commercialization of groundnut at 1% significance level (Table, 4). Marginal effect indicated that as the land size increases by 1 hectare the probability of farmer's participation decision in commercialization increases by 3.91% holding all other factors constant. This implies that land is one of the factors of production which helps farmers to allocate their land for different crops. This result is in line with the finding of（Ataul and Elias, 2015) that as the land size increases, the probability of decision for commercialization increases.

Access to market information (Acc.mrktinfn): Found to have positive and significant influences on the farmer's participation decision in groundnut commercialization at 1% significance level (Table, 4). Marginal effect of this variable after probit regression disclosed that as farmer's has access to market information the probability of participation decision in commercialization increases by 2.16% keeping all other factors constant. This indicates that access to market information helps farmers' to be market oriented for their production (when and where to sell). This study is in line with the finding of (Yassin *et al*., 2016) that access to market information has a positive and significant impact on the households' market participation decision.

Non/off-farm income (NOFI): It had negative and significant influences on the farmers' participation decision in groundnut commercialization at 10% significance level (Table, 4). Marginal effect of the variable indicated that as the income generated from non/off-farm activities increases by thousand birr the probability of participation decision in commercialization decreases by 0.07% keeping all other factors constant. The possible reason is that groundnut commercialization is risk bearing agricultural activities as compared to non/off-farm income generating activities. Furthermore, engagement in non/off-farm activities easily generates income in a short period of time. This finding is in line with the finding of (Gabriel, 2017) that getting more non/off-farm income represents additional wealth which constrain household not to participate in cash crops.

Table 4.determinants of farmers' participation decision in groundnut commercialization

Variables	Coefficient	Robust Std. Err	P>|z|	Marginal effect
Constant	4.1504***	1.0943	0.000	
Sex of HH	.0004	.5122	0.999	5.08e-06
Age of HH	-.0795***	.0210	0.000	-.0011
Education HH	-.1299**	.0533	0.015	-.0018
Household SZ	-.1153	.0950	0.225	-.0016
LVST	-.0071	.0585	0.903	-.0001
Land SZ	2.7621***	.6245	0.000	.0391
NOFI	-.0473*	.0265	0.075	-.0007
Acc.mrktinfn	.9485 ***	.3385	0.005	.0216
extn.con.	.0205	.0383	0.593	.0003
Credit	. 0955	.1602	0.551	.0014
Dntm	-.6853***	.2142	0.001	-.0097

Number of obs = 160 Log likelihood = -32.229575
Wald chi2 (11) = 48.26 Prob > chi2 = 0.0000
Pseudo R^2 = 0.5107

Source: own survey result, 2019
Note: ***, **,* represents significant at 1%, 5% and 10% level respectively.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Farm households' groundnut commercialization decision has association with different factors. The factors such as age of household heads, education level of household heads, land holding size, access to market information, non/off -farm income and distance to the nearest market have significant relationships with farm households' groundnut commercialization decision. This suggests that households' commercialization decision being influenced by different factors. Generally, smallholder farmers' groundnut commercialization decision being influenced by different factors in the study area.

Recommendations

The following recommendations are given based on the results of probit model.
Age of sample respondent has negative relationship with participation decision in groundnut commercialization. Therefore, both government and non-government organization should introduce capital intensive technologies in order to increase participation of older farmers in groundnut production and commercialization. Likewise, distance to the nearest market negatively and significantly influences households' participation decision in groundnut commercialization. Government should strengthen and promote better access to quality road and transportation facilities to help farmers to participate in commercialization decision with low transaction costs.

Land size positively and significantly influences farmers' commercialization decision. Since expansion of cultivation land is impossible in the study area. Agriculture and natural resource sector should encourage farmers to use intensive farming system by using full packages of technologies on scarce land resource to increase participation decision in groundnut commercialization. Access to market information has also positive influences on households' commercialization decision. Therefore, extension organization and farmers' cooperatives should deliver reliable market information on time to help farmers benefit from groundnut commercialization.

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