

Determinants of Smallholder Farmers' Participation Decision in Teff Production: Evidence from Horo and Jimma Geneti Woreda, Ethiopia

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Abstract

This study investigates the factors affecting smallholder farmers' participation decision in teff production in the Horo and Jimma Geneti districts of Oromia State, Ethiopia. The major primary sources of data for the study were farm household surveys, focus group discussions and key informant interviews. The study revealed that the annual average teff production of respondents was found to be below the standard annual requirement recommended by the national agricultural bureau. Although the study areas have potential land and are among the few areas which are agro-ecologically suitable for teff production and productivity in the country, smallholder farmers are not participating actively in its production (constrained by a number of factors). This study assesses factors determining smallholders' participation in teff production in Horo and Jimma Geneti, Horo Guduru Wollega zone, Ethiopia. Using structured questionnaires, the data was collected from a random sample of 320 smallholder farmers and analyzed by using a Probit regression analysis. Of the total sample respondents (320) 237 households are male headed (74.06%) while 83 (25.94%) are female headed. The study found that of the total participants 220 (80%) are males while the rest 20% are females. Similarly 100(68%) of the non participants are females while 53 (32%) are males. The result reveals that more male headed households participate in teff production than female headed ones. This study assesses factors determining smallholders' participation in teff production in Horo and Jimma Geneti districts, Ethiopia. Probit Model econometric estimation procedure was employed to analyze the effects of different explanatory variables on farmers' participation decision in teff production. With regard to the probit model results, ten variables hypothesized to affect Farmers' participation were included. The results of the probit model revealed that the coefficients of 5 variables were found to be significantly creating variation on the probability of farmers' production participation. The variables that turned out to be significant include: age of the household head, fertility of farm land, number of Oxen owned by the household, family labour and the distance of the households' residence from extension service. The implication is that production potential due to favorable agro-ecological condition is necessary but not sufficient for smallholder farmers to participate in teff production. Indicating household specific and institutional factors also influence their decision. The probit model result showed that age of the household head ($p < 0.016$), possession of oxen ($p < 0.000$), fertility status of land ($p = 0.004$), family labour ($p = 0.024$), distance from extension service ($p = 0.001$), were determinant variables. Smallholder farmers' decision to participate was affected by these factors. According to this finding both smallholder farmers and the local development agents should give attention to those significant variables with care and design a better production strategy focusing on effective supervision, training and approval of appropriate credit institution site so as to enhance the farmers' participation in teff production thereby raise productivity of agricultural sector.

Keywords: Agriculture, teff, production, factors, smallholder farmer, households, Oromia, Ethiopia

INTRODUCTION

In Ethiopia, smallholder agriculture shares more than 90% of the total agricultural output. The sound performance of agriculture warrants the availability of food crops. This accomplishment in agriculture does not only signify the adequate acquisition of food crops to attain food security, but also heralds a positive aspect of the economy. In regard to this, collective efforts are being geared to securing agricultural outputs of the desired level so that self reliance in food supply can be achieved and disaster caused food shortages be contained in the shortest possible time in Ethiopia. The prime role that agriculture plays in a country's political, economic and social stability makes measures of agricultural productions extremely sensitive (CSA, 2015).

Cereal crops are a major source of income for much of Ethiopia, providing the livelihood for millions of rural households. The growing of cereal crops is seen as one way to help farmers improve their current situation, (Berhanu, 2012). Given their potential key role in development and as a vehicle for reducing poverty, it is not surprising that the policy debate has focused on how to promote the production of these crops, how to create the enabling conditions for smallholders to benefit from the opportunities created by commercial agriculture, and how to design public policies to facilitate this process (Dawit 2012, Zelalem 2014).

According to the Central Statistical Authority of Ethiopia, the results of the year 2015/16, Meher Season Post-harvest Crop Production Survey indicate that a total land area of about 12,486,270.87 hectares are covered by grain crops i.e. cereals, pulses and oilseeds, from which a total volume of about 266,828,807.04

quintals of grains are obtained, from private peasant holdings. Within the category of Grain crops, Cereals are the major food crops both in terms of the area they are planted and volume of production obtained. They are produced in larger volume compared with other crops because they are the principal staple crops. Cereals are grown in all the regions with varying quantity as shown in the survey results.

Out of the total grain crop area, **79.88% (9,974,316.28 hectares)** was under cereals. Teff, maize, sorghum and wheat took up 22.95% (about 2,866,052.99 hectares), 16.91% (about 2,111,518.23 hectares), 14.85 % (about 1,854,710.93 hectares) and 13.33% (about 1,664,564.62 hectares) of the grain crop area, respectively. As to production, the tables paint similar picture as that of the area. Cereals contributed **86.68%** (about **231,287,970.83** quintals) of the grain production. Maize, teff, wheat and sorghum made up 26.80% (71,508,354.11 quintals), 16.76% (44,713,786.91 quintals), 15.81% (42,192,572.23 quintals) and 16.20% (43,232,997.52 quintals) of the grain production, in the same order (CSA, 2015).

Teff is Ethiopia's most valuable staple crop. Cultivated over approximately 2.8 million hectares teff accounts for 28.5 percent of land area under cereal cultivation, the largest share of all staple grains in Ethiopia. Teff is indigenous to Ethiopia and is a fundamental part of the culture, tradition and food security of its people (MoARD-2010). Teff bread, locally known as *injera*, is a major staple food for many Ethiopians. Most prefer teff to other grains but is in general more widely consumed by the economically better off urban residents than by rural households. Teff contributes up to 600 kcal/day in urban areas compared to only 200 kcal/day in rural areas (CSA, 2015).

Studies have shown that income elasticity of teff is the highest among cereals, and greater than one in both urban and rural areas: a one percent increase in income increases demand by more than one percent. Teff is more of a luxury food for rural households and the urban poor, while maize and wheat are necessity food grains. As teff prices have gone up, many urban households tend to mix teff flour with cheaper cereals such as sorghum, maize or rice in preparing *injera* (Berhanu, 2012).

According to Agricultural Bureau of Horo Guduru Wollega zone (2015), the share of teff in total cereal consumption has sharply declined since 1961, moving from 31 percent in 1961-70 to 18 percent in 2001-2007. There has been a considerable shift from teff to maize consumption, influenced by a number of factors. Teff is a commercial crop mainly because of the high price it fetches and the absence of alternative cash crops (such as coffee, tea or cotton) in the major teff producing areas of Oromia. Assemblers in village markets and wholesalers in regional markets pay close attention to the quality of teff. Teff can provide a good source of income and which can also have beneficial effects on the environment. The chief agricultural cereal crop products in Horo Guduru zone especially in Jimma Geneti, Oromia include Maize, Teff, Wheat, Sorghum and Barley (CSA, 2015/16). In Horo Guduru zone, of the total land 286,631.05 in hectares under grains production teff occupies 90,316.67 hectares followed by Maize which occupies 57,356.09 land in hectare. Cereal crop's farming is being cultivated by every farmer especially in small scale besides subsistence farming due to unavailability of fund and capital.

Like in many zones of Oromia, the people of Horo Guduru zone are largely dependent on agricultural with small holder cultivation of cereals, pulses and oilseeds mainly characterized by subsistence farming mixed with livestock rearing. In the zone, the smallholder farmers mainly produce Cereal crops with maize and teff the major ones for consumption and creating ample employment opportunities. The yield and productivity of the sector is very low and susceptible to fluctuations due to out-dated methods of production, lack of improved technology and skill, and lack of business start-up budget, high dependence on family labor, inadequate credit institutions and unpredictable natural factors such as rainfall (excessive or scanty), soil fertility and pests. Not all farmers grow enough food to feed themselves from harvest to harvest (Horo Guduru Zone's Bureau, 2016).

With this background, this study is designed to identify and analyze factors that determine farmers' probability of farmers' decision to participate in Cereal Crops in Jimma Geneti Woreda of Horo Guduru Zone, and through that make recommendations to improve the awareness of farmers.

Objectives of the Study

The ultimate objective of the study is to identify and analyze major socio-economic and institutional factors impeding deepening of the probability Teff production in Horo and Jimma Geneti Woredas and through that make recommendations to improve the effectiveness of interventions.

The specific objectives of this study include:

- ✎ to identify and analyze the factors (household and institutional) those determine the production decision of teff;
- ✎ to encourage cereal crops farming,
- ✎ to enhance the production of cereal crops in the land and to place Jima Geneti Woreda in the forefront in cereal crops production among others in Ethiopia.

WORKING HYPOTHESIS

The following hypothesis can be tested using the Likelihood ratio test: $LR(\lambda) = 2(ULLF - RLLF)$, Where,

ULLF and RLLF are the values of unrestricted log-likelihood function under H_1 and that of the restricted log-likelihood function under H_0 , respectively (Gujarati, 2004). The null hypothesis is rejected if the calculated chi-square is over than the critical chi-square with degrees of freedom equal to the number of restrictions at null hypothesis at 1%, 10% or 5% level of significance i.e. $LR > \chi^2$ (Greene, 1992 and Woodridge, 1993). If the sample size is large the test statistic λ follows the chi-square (χ^2) distribution with degrees of freedom equal to the number of restrictions imposed by the null hypothesis.

We can formulate the following null hypotheses:

1. Participation in teff production and age (experience-in years) are inversely related.
2. Participation in teff production does not vary interms of mean land holding.
3. Participation in teff production and number of Oxen are unrelated.
4. Participation in teff production do not vary with family labour.

Research Questions

The following research questions helped the researcher to achieve his objective;

1. Does Jima Geneti Agricultural Development Agents encourage the production of Cereal crops among her people?
2. Are the sales of teff within the land or outside the land attractive?
3. Are there any frequent changes in the participation of teff production in the Woreda?
4. Does teff production earn the farmers more gain than other cereal food crops in the land?
5. Are warehouses or storage facilities available in Jima Geneti Woreda?

REVIEW OF RELATED LITERATURE

Agriculture is the main occupation of the people which provides income and gainful employment for more than 85% of the population in Ethiopia. The main cereal crops being cultivated in the land are Maize, teff, Wheat, Barley and Sorghum. The first economic development strategy in Ethiopia was declared in 1957, when the First Five Year Plan (FFYP) (1957-1961) was prepared. In this plan, the attention given to peasant agriculture was very limited. Even in the Second Five Year Plan (SFYP) (1962-1966), which relatively gave better emphasis to the agricultural sector, the main objective was commercialization of the sector by encouraging big private farms than small holders. It was the Third Five Year Plan (TFYP) (1967-1971) which gave appropriate consideration to small farmers without ignoring the large scale commercial farms. In this plan, the objective was to increase the productivity of small farmers through the package program in selected areas. At the time, both the Comprehensive Package Project (CPP) and the Minimum Package Project (MPP) were launched, but the result obtained was not satisfactory because of lack of finance and the low level of participation of tenants resulting from the existing land tenure system (Assefa, 2009; Geremew, 2013).

The current government adopted the Agricultural Development Led Industrialization (ADLI) strategy as the overall development strategy of the country since 1995. One of the main facets of this strategy in the agricultural sector has been the generation, adoption and diffusion of new farm technologies in the form of new and improved inputs and practices. In the mobilization of small farmers and the dissemination of better farming practices, the agricultural development practices has been operationalized through Participatory Demonstration and Extension Training System (PADETS) (EDRI, 2004).

At the national level, teff has consistently accounted for more than 40 percent of fertilized land. In 2010/11, of the total fertilized area of 2.31 million hectare, 981,000 hectare was allocated to teff, which is almost 75 percent more than maize or wheat. It may seem counterintuitive that farmers are using more fertilizer in a low-yielding crop like teff. However, this is consistent with the fact that teff prices have been increasing in real terms for many years. As a result, price has become more favorable relatively for teff than for other cereals. In addition, due to ease of storage and long shelf life, farmers attach some intrinsic values to teff. On the other hand, fertilizer use in other cereals (barley, sorghum, rice, and millet) has been minimal relative to the three major cereals and the land allocated to them. Since 2003/04, about 2.6 million hectare, equivalent to 35 percent of total planted land, has been allocated to these cereals; but only about 4 percent of this land is fertilized implying the economics of fertilizer use in these non-tradable cereals has not been favorable (IFPRI 2013).

Individual farmers in Jima Geneti just naturally grow cereal crops as a livelihood, to consume, to generate fund for the family's needs and for the survival of other sector of the economy. Cereal crops' farming is advantageous as it serves as sources of living for the farmers, wages for the employees and farm workers, and revenues for the government through taxes (Dheressa, 2015). He then believed that maize and teff production was of the the most important crops in the Woreda. For long, it has been discovered that teff is a very important cereal crop not only for rural people but also for Urban people. There also, maize that is being produced in Jima Geneti is a very relevant cereal crop for home consumption and employment generation. However, maize is less important than teff interms of income generation and also maize is easily affected by animals, apes, Monkeys, Rats and others.

MAJOR PROBLEMS OF FARMING IN THE STUDY AREAS

There are a variety of food and non-food crops that have been produced together with livestock rearing in the Woredas. However, there is deterioration in yield of these crops from year to year. This is highly attributed to changes in weather condition leading to excessive and/or scanty rain fall where floods and droughts affected the farm production and productivity; lack of well constructed socio-economic infrastructures; land fragmentation; obsolete agricultural tools used, etc. Unpredictable weather condition is one of the naturally occurring problems in the Woredas. Almost all farming practices in the study areas is rainfall based. Thus, lack of adequate amount of rain, the variability and seasonality of rain fall have been affecting agricultural production from year to year.

Development of infrastructure and appropriate institutional support are an engine for economic development and growth. All-weather roads, potable water supply, well organized and equipped markets, communication (telecommunication, postal service, and internet), electricity, banks and credit facilities, extension advice, school and training centers, hospital and health centers, information centers, stores, etc are the main ones. Poor infrastructure is one of major problems of crop production in rural parts of the study areas. Transport and communication facilities are poorly developed and best production areas are located far away from all whether roads making transportation and distribution of agricultural inputs and collection as well as marketing of output difficult. Pack animals and/or humans have been transporting the bulk of the farm outputs. Thus, traditional means of transportation dominated the rural areas. Furthermore, shortage of farmland and grazing land, deforestation, high prices of agricultural inputs and insufficient veterinary services can be mentioned as problems in the district. Even though there is shortage of land in the districts, Jimma Geneti is a self-sufficient and surplus producing district with some areas suitable for irrigation in the future (Zonal offices, 2015).

RESEARCH METHODOLOGY

SAMPLING DESIGN AND SAMPLING METHODS

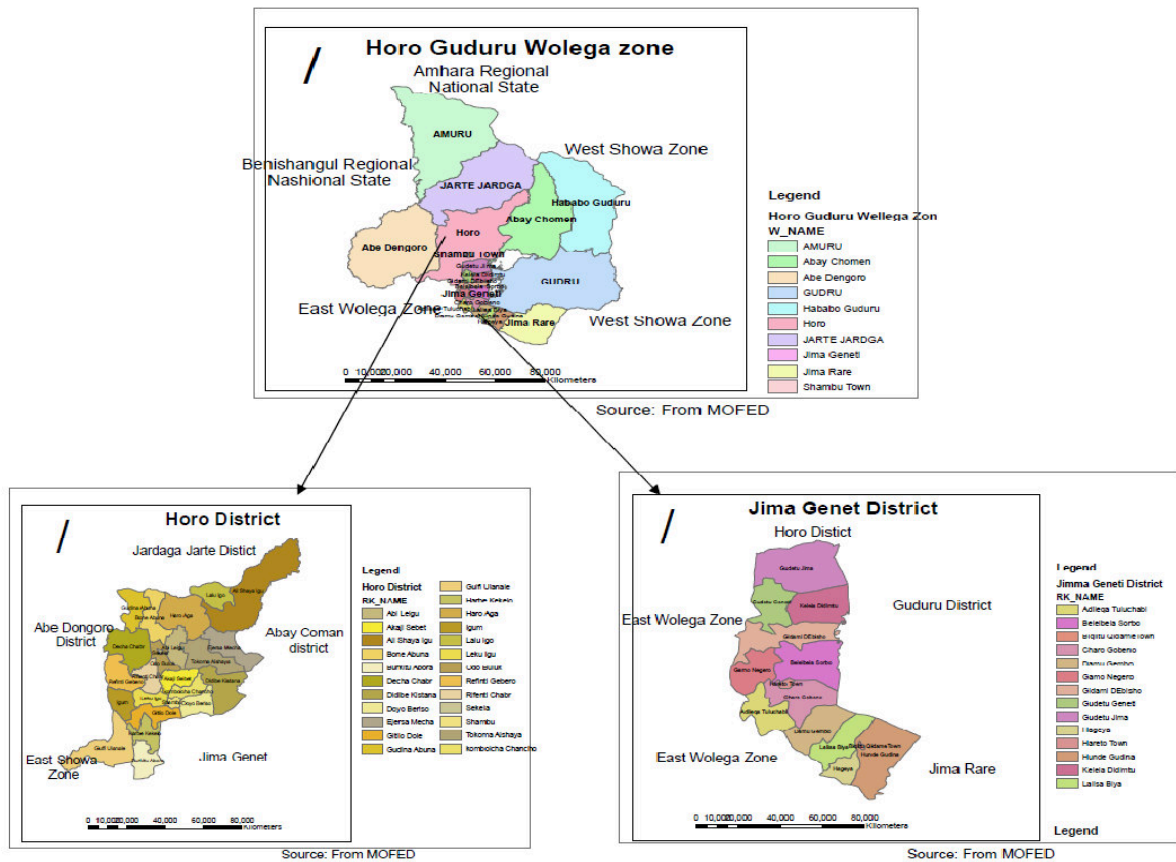
One of the seventeen Zones of Oromia regional state, Horo Guduru Zone, is the focus of this research. There are many reasons why Horo and Jima Geneti districts are selected for the study. The most important reason is that these districts are well known by the production of cereal crops in Ethiopian history. Its farm household's participation in cereal production is highly fluctuating and deteriorating compared to the other districts of the zone. These districts are, therefore, in need of research findings concerning issues of farmers' participation in teff production and related issues of marketing and off-farm employment that might contribute to improving the income of these farm operators.

In the selection of rural household respondents, a multistage sampling technique was used. What makes the sampling technique a multistage is that, firstly, one of the seventeen Zones was selected. Then, from all the districts in the Zone, two districts and four *tabias* from each district were selected. Finally, using systematic random sampling, respondents were selected from the list of farmers of each village found in the *tabia*. Horo Guduru Zone is located 287 kilometer far from the country's capital Addis Ababa. The zone has 10 Woredas of which two are chosen for this study. There are 198 kebeles in the zone of which 22 are in Horro and 14 are in Jimma Geneti Woredas. The zone's capital is Shambu town (in Horro Woreda) with 287km distance from Addis Ababa. According to the zone's communication and information office the total population of the zone in the year 2010 is 799,224 of which 654,955(82%) and 144,269(18%) are rural and urban residents, respectively. From this total population 375,261 (47%) are females whereas 423,963 (53%) are males. Of the zone's total population the inhabitants of Horro and Jimma Geneti Woredas are 103,035 and 75,341, respectively. Horro Woreda is occupied by 87,061(84.5%) and 15,974(15.5%) rural and urban households, respectively. Of the rural population 40,507(46.53%) are female and 46,554(53.47%) are male; and of the urban total population 3171(19.85%) are female and 12,803 (80.15%) are males. Similarly, Jimma Geneti Woreda, which is located at a distance of 260km from Addis Ababa and 27km from the zone, has total households of 75,341 of which 63,167(83.84%) are rural and 12,174(16.16%) urban households. From the rural dwellers 30,717(48.63%) are females and 32,450(51.37%) males; and of the urban total households 5,832(47.9%) are females and 6,342(52.1%) males (Zonal agricultural office data, 2015). The selected kebeles are from Horo: Bariso, Gitilo Najo, Kistana and Chabir; from Jima Geneti: Gudetu Ganati, Lalisa Biya, Balbala sorgo and Gaba Kidame. Accordingly, 40 households from each kebeles of Horro, and 40 households from each kebeles of Jima Geneti Woreda are randomly selected and hence, the sample size is 320 households which include both participants and non-participants of teff production.

DATA ANALYSIS

This study employed both descriptive research design and econometric model to analyze the determinants of smallholder farmers' decision to participate in teff production in Jima Geneti and Horo Woredas of Oromia State. Only 320 farmers were randomly selected for the sampling technique and a questionnaire was designed and used

to collect data for the study. The data collected were analyzed by using percentages and probit regression.
 Figure: **Map of the Study area**



Once the factors (household and institutional) that determine farmers' participation in teff production are identified probit regression function is employed to show the functional form and relationship of these factors with the participation decision and/or saving decision. Using probit model the functional relationship of participation decision (Y_i) and its determinants can be given by: $Pr(Y=1/X_i) = \Phi(Z_i)$

$Z_i = \beta_0 + \beta_1age + \beta_2Educhd + \beta_3familylabour + \beta_4landsize + \beta_5Oxen + \beta_6 Credit + \beta_7extension + \beta_8fertst + \beta_9nofm$), Where the dependent variable Y represents farmers' participation decision, Φ is the cumulative standard normal distribution function and age, Education level of house hold head, Family labour, Land size, Number of oxen, --- Distance to extension are determinants of participation.

RESULTS AND DISCUSSION

HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS

Of the total sample respondents (320) 237 households are male headed (74.06%) while 83 (25.94%) are female headed. The study found that of the total participants 220 (80%) are males while the rest 20% are females. Similarly 100(68%) of the non participants are females while 53 (32%) are males. The result reveals that more male headed households participate in teff production than female headed ones. However, the χ^2 statistics indicates that there was no significant difference between male and female on participation. The result shows that more than half of sampled farmers 240 (70.20%) have attended either formal or informal school with 177 households (53.45%) had completed at most grades 7 and 8; 20 households (5%) had completed grades 9 and 10; 5 households (3.13%) had learnt preparatory education, i.e. grades 11 and 12, and 5 households (1.54%) were diploma holders while the remaining 118 (36.88%) of the respondents are found to be illiterate. From the total male headed households, 164 households (69.2%) are literates while the remaining (30.8%) are illiterates meaning that they cannot, atleast, read and write. Of the total female headed households, 40 households (48.2%) are literates while the remaining 43 (51.8%) are illiterates.

The average family size of the sample respondents was 5.33 and the average family sizes of the participants and non-participants were 5.20 and 5.53, respectively. The mean difference between the two groups was 0.33 and found to be statistically insignificant at 5% significance level. Comparing teff production participation versus non-participation in terms of average annual expenditure on social and religious ceremonies, there is statistically insignificant difference at 5% level of significance and hence, the null hypothesis $H_0: \text{diff} = \text{mean}(0) - \text{mean}(1) = 0$ is accepted at 5% level of significance and 318 degrees of freedom against the

alternative hypothesis H_a : H_0 is not true. With the mean difference of 0.2984579, the probabilities $\Pr(|T| > |t|) = 0.8928$ (H_a : $\text{diff} \neq 0$) and $\Pr(T > t) = 0.4464$ (H_a : $\text{diff} > 0$) are over than 0.05 revealing the zero mean difference among participants and non-participants in terms of average annual expenditure on social and religious ceremonies .

The data in Table 1 shows the participation distribution of the respondents by mean difference.

Table1: Participation Distribution of the household heads by mean difference in some selected average variables

S.No	Item	Production non	Participants	Mean	t-ratio for Mean
		Participants		difference	difference
		Mean	Mean		
1	age	44	40	4	2.87**
2	famsize	5.53	5.20	0.33	1.274
3	Landsize	6.4673	6.1688	0.2984	0.134
4	famlab	2.89	2	0.89	4.093**
5	Extens	11.593	8.0124	3.5806	7.72*
6	Oxen	0.6993	1.5930	-0.8937	-4.70*
7	nofm	13.31384	24.9854	-11.67155	-7.58*

Source: own computation from rural Oromia microfinance survey (2010)

** and * are statistically significant at 1% and 5% significance levels, respectively

Table2: Resource Endowment of sampled households by Teff production participation

Group	Average Farm size(ha)	t-ratio	Observation(N _q)
non participants	1.923 (1.3663)		153
participants	3.275 (1.6671)		167
Difference	-1.352 (2.1781)	-6.2067	
Group	Average ox holding(TLU)	t-ratio	Observation(N _q)
non participants	0.6993464 (0.0941554)		153
participants	1.592814 (0.160296)		167
Difference	-0.893468 (0.1901922)	-4.6977	
Group	Average Livestock (TLU)	t-ratio	Observation(N _q)
non participants	3.126458 (0.3080453)		153
participants	6.028407 (0.513355)		167
Difference	-2.90195(0.6120745)	-4.7412	
Group	Average Active labour	t-ratio	Observation(N _q)
non participants	2.640523 (0.116794)		153
participants	3.155689 (0.118906)		167
Difference	-0.5151657 (0.1671229)	-3.0826	
Group	Average N _q of literate household members	t-ratio	Observation(N _q)
non participants	1.666667(0.1454504)		153
participants	3.874251(0.1937222)		167
Difference	-2.207585(0.2456619)	-8.9863	

Source: own computation from rural Oromia microfinance survey (2016). Table 3: Estimates of

Table 3: Estimates of Maximum-likelihood probit model on the determinants of smallholder farmers' participation decision on teff production

Variables	Coefficients	Z-value(P> z)	Marginal effects(average=X)
age	-0.1041572	-2.99**(0.016)	-0.0403316 (41.99)
Extens	-0.091133	-4.31*(0.001)	-0.0352884 (9.72)
famsize	0.0958403	1.14(0.252)	0.0371112 (2.91)
Landsize	0.0126722	1.25**(0.214)	0.0049069(27.17)
credit	0.4230832	1.50 (0.132)	0.16671(0.84)
educhd	0.1702837	1.07*(0.200)	0.0659371(3.93)
nofm	0.3630538	1.56**(0.218)	0.1368729(0.29)
Oxen	0.0521624	6.75* (0.000)	0.336364(2.55)
famlab	0.0560434	3.2**(0.024)	0.0217011(2.44)
fertst	0.6056701	5.011**(0.004)	0.236022(0.31)
Restricted log likelihood = -221.50075		Number of obs = 320	
Unrestricted log likelihood = -118.24125		LR chi2(9) = 206.52	
		Prob > chi2 = 0.0000	
Marginal effects after probit: $y = \Pr(y1)$ (predict) = 0.59647685			

Source: own computation from rural Oromia household survey (2016)

*, ** and *** shows significance at 1%, 5% and 10% significance levels, respectively.

Table (3) above presents factors influencing smallholder farmers' probability decision to participate in teff production. Ten variables were considered and regressed as explanatory variables in determining the probability participation of farmers in this regard. The above probit result also shows that age positively and significantly influenced (at 5% level of significance) the probability of farmers' participation in teff production. The studies conducted by Desale (2012) and Derara (2013) indicate that as age progresses farmers will acquire experience and the level of responsibility to manage the family and the need to produce crops for tomorrow become increased. The marginal effect on age shows that a marginal change in age from the average of 42 years is associated with a 1.38% increase in farmers' probability of participation in teff production, ceteris paribus.

Farmers that have frequent contact with Development Agents get information on new technologies more frequently and easily. This might increase their working capital requirement. Therefore, access to extension service influences the farm households' participation. The results of the model showed that distance of farmers' house from extension service (development agents) is associated with the probability of farmers' decision to produce teff negatively and significantly at 1% level of significance. This is due to the fact that a farmer nearby extension service has a location advantage and can get relevant information on teff production easily. The marginal effect of this variable indicates that a marginal change in a distance a farmer travels from 9.724 to 10.724 kilometer is associated with a 3.53% reduction in smallholder farmers' participation decision in teff production, other variables held constant at their average.

The regression result revealed that farm land size is one of the factors in determining decision of a farmer to participate in teff production in Horo and Jima Geneti districts. The findings by Geremew suggest that land is an important factor in influencing farmer's decision to produce any cash crop (Geremew, 2013), hence support the current finding. Besides, the result discovered that family labour is one of the critical variables in influencing decisions of households to produce teff in the study area, ceteris paribus. Thus, farmers who have more access to family labour are more likely to participate in teff production. The possible reason is that labour markets are highly imperfect in this area while teff productions - from land preparation to its harvest - require labour and lack of such access has a great impact on farmer's decision to produce this crop. This indicates that farmers who have access to more family labour are likely to participate in teff production under ceteris paribus assumption. Furthermore, soil fertility refers to the productivity of the soil with little or no application of fertilizer. The more the soil fertility, the more productivity of the land is. These farmers reported that, even if they have access to labour from market, their farm land lack fertility. Based on the result, we obtained the evidence that support such positive linkage between access to fertile land and probability to produce teff. The marginal effect on fertility of land status shows that the probability to produce teff increases by 23.60% for those farmers that have participated in teff production compared to their counterparts.

Access to household assets such as oxen also determines the probability of farmers' decision to produce teff significantly. Thus, these household assets are among the factors that influence farmers' decision to participate in teff production in the study area. The marginal effect for Oxen revealed that a marginal change in Oxen from the average of 2.55 in number is associated with a 33.63% increase in the probability of farmers' participation decision in teff production in the study area, keeping other variables constant at their average.

CONCLUSION AND RECOMMENDATION

This study assesses factors determining smallholders' participation in teff production in Horo and Jima Geneti districts, Ethiopia. Probit Model econometric estimation procedure was employed to analyze the effects of different explanatory variables on farmers' participation decision in teff production. With regard to the probit model results, ten variables hypothesized to affect Farmers' participation were included. The results of the probit model revealed that the coefficients of 5 variables were found to be significantly creating variation on the probability of farmers' production participation. The variables that turned out to be significant include: age of the household head, fertility of farm land, number of Oxen owned by the household, family labour and the distance of the households' residence from extension service. The implication is that production potential due to favorable agro-ecological condition is necessary but not sufficient for smallholder farmers to participation in teff production. Indicating household specific and institutional factors also influence their decision. Thus, if active participation of smallholder farmer is required in the field, institutional innovations should be developed and strengthened, in a way to involve all smallholder farmers.

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