Determinants of Teff Market Channel Choice in Abay Chomen District, Western Ethiopia

*Yadeta Bekele¹, Temesgen Hirko²

¹Department of Agricultural Economics and Agribusiness Management, Jimma University, Jimma, Ethiopia
²Department of Agricultural Economics, Wolkite University, Wolkite, Ethiopia

This study analyzes the determinants of Teff market outlet choices in Abay chomen District of Ethiopia. Survey of one hundred eighty-four (184) household heads was conducted in three kebeles of the district in 2016. Multivariate Probit model was used to identify determinants of households’ teff market outlet choice decisions. Farm gate collectors, retailers and wholesaler marketing outlets were used by teff producing farmers in the study area. The model result revealed that age of the households significantly determined the probability of choosing farm gate, retailers and wholesalers market outlets. The study also revealed that sex, land size and quantity of teff produced in 2016 significantly affected the farm gate outlet choice of the smallholders. Additionally, the retailer outlet choice of farmers was significantly determined by quantity of teff produced. On the other hand, the wholesale market outlet choice of farmers was significantly determined by education level of the farmers. This implies that the need to invest on improving the education status of farmers; improving the production capacity of farmers that would help smallholder farmers to choose the more rewarding market outlet. Therefore, any policy attempting to benefit smallholder farmers to link with fair market outlets should focus on their educational status and their production capacity.

Keywords: Market outlet choices, Determinants, Multivariate probit model.

INTRODUCTION

Agriculture is still the main stay of Ethiopian economy sharing about 43% of the GDP, 80% of employment and 90% of the export value (MoFED, 2011). Teff is the major cereal crop of Ethiopia. It is highly adapted to diverse agro ecological zones. Teff production is the major component of farming in the study area. It is widely produced by majority of the farmers and playing diverse role in the diets of the community. It is ideal crop for reducing poverty, improving human health, nutrition and cash generation in the area. It is indigenous to Ethiopia and is a fundamental part of the culture, tradition and food security of its people (MoARD,2010). It is cultivated over 2.8 million hectares in the country. It also accounts for 28.5 percent of land area under cereal cultivation, the largest share of all staple grains in Ethiopia. ‘Injera’ locally made from teff, is a major staple food for many Ethiopians. Teff is widely consumed by the economically better off urban residents than by rural households. It 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.

*Corresponding author: Yadeta Bekele, Department of Agricultural Economics and Agribusiness Management, Jimma University, Jimma, Ethiopia. Email: yadeta11@gmail.com
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 study area. 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 lands in hectare.

Like in many zones of Oromia, the people of Horo Guduru zone are largely dependent on agriculture with small holder cultivation of cereals, pulses and oilseeds mainly characterized by subsistence farming mixed with livestock rearing. 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 insufficient), soil fertility and pests. Not all farmers grow enough food to feed themselves from harvest to harvest (Horo Guduru Zone’s Bureau, 2016).

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 hectares were allocated to teff, which is almost75 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).

Markets are the means for smallholder farmers to integrate into the national economies in most developing countries. They provide the opportunity for farm production to contribute to poverty reduction through the cash income realized from sales of farm produce. In turn, markets drive production as farmers endeavor to meet the demands of consumers and end-users in terms of quantity and quality. But their very existence, or how effectively they function, cannot be guaranteed in many developing countries. In Ethiopia, there is a certain urgency to address the real concern that, in spite of considerable investments into restructuring the sector since 1992 and directly tackle agrarian and land reform, poverty is still widespread and there is the clear indication that much of this arises from farmers not being able to sell produce at a profit. Unlocking markets for this group of farmers is therefore considered a crucial developmental necessity. Research and case studies conducted in various parts of the country point to the importance of the market access to smallholders (Chilot et al., 2010).

Marketing outlet choice is one of the most important farm household decisions to sell their produce in different marketing outlets and has a great impact on household income. Market outlets choices are household specific decision and several drivers have to be considered as a basis for such decision. Various empirical studies pointed out that smallholder farmer’s decision to choose different market outlet can be affected by household characteristics, resource endowments and access to different market outlets prices and transportation cost. Lack of market knowledge or difficulties in accessing markets that are more rewarding makes smallholder farmers to transact their produce through outlet offering low price.

**Empirical Literature Review: Teff market outlet choice and It’s determinants**

Many researchers used logit and probit for categorical market outlet choices for different agricultural products. Multivariate probit estimation has been used in many studies to identify factors affecting adoption of agricultural technologies. Gillespie, *et al.*, 2004; Jenkins *et al.*, 2011 used this approach to identify factors that affect cotton producers’ adoption pattern of different information sources i.e. private, extension and media and to estimate factors that affect adoption of four breeding technologies.

Jari and Fraser (2009) identified that market information, expertise on grades and standards, contractual agreements, social capital, market infrastructure, group participation and tradition significantly influence household marketing behavior. The study uses multivariate probit model to investigate the factors that influence marketing choices among smallholder farmers.

Padmanand *et al.* (2015) used multivariate probit model and confirmed that, income, education, employment status, household size, and distance influence shopping frequency in all five outlet types selected. Income had positive effect whereas household size was negatively associated with supper marketing channel choices.

A multivariate probit model was used to analyze the diversification of the marketing chains and channel choices among oil seed producers. The results suggest
that farmers’ personal characteristics influence their choice, and that more educated and skilled farmers are less likely to choose traditional marketing chains and more likely to engage in the new marketing chains (Corsi et al., 2009).

This study intended to address the following specific objectives: (i) identify different teff marketing channels; (ii) determine factors determining households' choice of teff market channels. Thus, factors affecting market outlet choices of smallholder teff farmers become essential to provide vital information for effective research planning and intervention.

RESEARCH METHODOLOGY

The study was conducted in three kebeles (Achane, Ganji Qare and Gutane) of Abay Chomen district, Horo guduru Wollega zone. Abay Chomen District is one of the 9 districts in Horro Guduru Wollega zone of Oromia regional state of Ethiopia, containing 19 kebeles, located at 9° 31' 42" to 9° 59' 48" N latitude and 37° 10' 03" to 37° 28' 44" E longitude and the capital of the district Fincha town is 289 kms far northwest of Addis Ababa. The District is bordered on the east by Ababo Guduru district, on the southeast by Guduru district, on the south by Fincha river, on the south west by the Jimma Geneti district, on the northwest by Amuru Jarte district and on the north by the Abay river which separates it from the Amhara region. The area receives high rainfall in one season of the year. The total area of the District is estimated to be 801.7 km²; approximately 45, 37, 4, 3 and 11% of the total area are cultivated land, non-cultivated, water bodies, settlements, and woodlands and forests, respectively (Tegbaru, 2014). The Ethiopian population projection by CSA for 2017, based on 2007 national census reported a total population for this district to be 64,672, of whom 33,263 (51.43%) were male and 31,409 (48.57%) were female; 15,232 or 23.55% of its population were urban dwellers (CSA, 2013). The majority of the inhabitants were Protestant, (59.73%), while 31.84% reported Ethiopian Orthodox Christianity, 5.5% reported their traditional beliefs, and 1.61% was Muslim (CSA, 2007).

The altitude of the study area ranges from 1,061 to 2,492 meters above sea level (masl) with two agro ecological zones, mid-highland and low land. The northern part of the district (low land), which is mainly situated at altitude ranging from 1,138 to 1,687 masl in the Nile River Basin, is owned by Fincha Sugar Factory and is entirely being used for irrigated sugarcane (Saccharum officinarum L.) production. At altitudes ranging from 2,213 to 2,492 masl (mid-highland), smallholder farmers practice mixed farming systems that integrate both crops and livestock (animals used for traction, meat and milk). These areas are under intensive cultivation and maize (Zea mays L.), teff (Eragrostis tef (Zucc.) Trotter), bread wheat (Triticum aestivum L.), niger seed (Guizotia abyssinica), barley (Hordeum vulgare L.) and faba bean (Vicia faba L.) are the major crops grown by rain-fed agriculture (CSA, 2013). Areas situated at altitude ranging from 1,061 to 1,138 and 1,687 to 2,213 masl are mainly woodlands and forests, and non-cultivated escarpments (Tegbaru, 2014).

The recent years meteorological data of the nearby representative stations, Fincha Sugar Factory and Shambu Meteorological Stations showed that the mean annual minimum and maximum temperatures of the district are 13.4 and 27.2 °C, respectively, and the mean annual rainfall is 1,399 mm (Tegbaru, 2014). The area has a unimodal rainfall pattern and the highest intensity of rainfall is recorded in the month of July. The area is characterized as hot to warm moist lowland and tepid to cool moist mid-highlands based on the classification of agro-ecological zones of Ethiopia (Alemayehu, 2006).
Combinations of qualitative and quantitative methods were used for primary data collection. For household questionnaire survey, 184 households were interviewed.

**Data Source and Type**

Both primary and secondary data sources were used. Teff producing households were interviewed using structured questionnaire. The questionnaire was designed to explore the teff production, marketing, and market channels. To complement the structured survey, personal observation and secondary data collection were conducted.

**Sampling Procedure and Methods of Data Collection**

A simple random sampling procedure was used for this study. Three kebeles had been selected, based on their production potential. 184 teff producing households were randomly selected from three kebeles according to population proportion to size.

The study was applied a simplified equation: \[ n = \frac{N}{1+N(e^2)} \]
where \( n \) is sample size, \( N \) is population size and \( e \) is level of precision provided by Yamane (1967) to determine the required sample size at 95% confident level.

Data were generated from a survey of 184 households by multistage sampling procedure. Abay Chomen district was purposively selected based on the potential of teff production. Three kebeles from the district were selected randomly. A probability proportional to sample size sampling procedure was employed to select a total of 184 households.

Primary data were collected using three enumerators from each kebele office of agriculture under the supervision of the researcher. Before the actual data collection, orientation was given to the enumerators on the content of questionnaire.

**Data Analysis**

Primary data were entered in the SPSS spread sheet and cleaned for irregularities. STATA software was used to analyse the data collected.

**Econometric Model specification**

The outcome is nominal because the categories are assumed to be unordered. Therefore, the most appropriate model to estimate farmers’ decision to sell in one of these three different market channels is a strategy choice model, specifically a Multivariate probit Model (MvProbit). This model was used because it is the standard method for estimating unordered, multi category dependent variables. It also assumes independence across the choices, that is, it does not allow correlation or substitution between them (Wooldridge, 2008). On top of this, when individuals can participate in more than one choice at the same time, multivariate probit model is more appropriate.

**Market outlet choice model**

A multivariate probit model was applied to explain the effect of different factors on the choice of market channels. A multivariate probit was used previously in a number of adoption studies to account for simultaneous adoption of multiple varieties and the potential correlations among the adoption decisions. The multivariate probit is an extension of the probit model and used to estimate several correlated binary outcomes jointly. With respect to the structure of the theoretical model and the dependent variables, a multivariate probit model is as a generalization of the bivariate probit model as presented in Maddala (1983).

For this study the multivariate probit model was employed to determine the market out let choice of teff producers since farmers have more than one option to sale their product.

The equation can be written as follows:

\[ y_{im} = \beta_m X_{im} + \varepsilon_{im} \]

Where \( y_{im} \) (m = 1... k) represent the dependent variable of teff market outlet selected by the \( i \)th farmer (i = 1... n). The dependent variables are the polychotomous variable indicating whether sales are made through the relevant marketing outlet. The outlet has been aggregated into many groups: farm gate, retailers and wholesalers. Each farmer can use one or more marketing outlet. \( X_{im} \) is a \( 1 \times k \) independent variables that affect the choice of marketing outlet decisions and \( \beta_m \) is a \( k \times 1 \) vector of unknown parameters to be estimated. \( \varepsilon_{im} \), \( m = 1, ..., m \) are the error terms distributed as multivariate normal, each with a mean of zero, and variance-covariance matrix \( V \), where \( V \) has values of 1 on the leading diagonal and its correlations. The system of multivariate probit equations has been shown in the following ways.

\[ y_{1i} = \beta_{1i} x_{1i} + \varepsilon_{1i} \]
\[ y_{2i} = \beta_{2i} x_{2i} + \varepsilon_{2i} \]
\[ y_{3i} = \beta_{3i} x_{3i} + \varepsilon_{3i} \]

The latent dependent variables are observed through the decision to choose outlet or not (\( y_{ki} \)).

\[ Y_{im} = \begin{cases} 1 & \text{if } \varepsilon_{im} > 0 \text{ k=1, 2, 3} \\ 0 & \text{otherwise} \end{cases} \]

0, Otherwise

There are six joint probabilities corresponding to six possible combinations of choosing and not choosing each of the three outlets. The probability that all three components of the Teff market outlet have been selected by household ‘i’ is given as:

\[ Pr(y_{1i}=1, y_{2i}=1, y_{3i}=1) = \Pr (\varepsilon_{1i} < \beta_{1i} x_{1i}, \varepsilon_{2i} < \beta_{2i} x_{2i} \varepsilon_{3i} < \beta_{3i} x_{3i} ) \cdots = 1, y \]
\[ \Pr(y_1=1, y_2=1, y_3=1) = \Pr(\varepsilon_{3i} < \beta'_2 X_{2i}, \varepsilon_{1i} < \beta'_1 X_{1i}) \] 
\[ \Pr(y_1=1, y_2=1, y_3=1) = \exp \left( \varepsilon_{2i} < \beta'_2 X_{2i}, \varepsilon_{1i} < \beta'_1 X_{1i} \right) \] 

Where:

- \( Y_{1i} \): for household who choose farm gate outlet, 0 otherwise
- \( Y_{2i} \): for household who choose retailers outlet, 0 otherwise
- \( Y_{3i} \): for household who choose Wholesalers outlet, 0 otherwise

\( X'_{1i}, X_{2i} \) and \( X_{3i} \) are Vectors of explanatory variables \( X' \) for each channel

\( \beta'_1, \beta'_2, \) and \( \beta'_3 \) are vector of parameters to be estimated for each channel

\( \varepsilon_{1i}, \varepsilon_{2i}, \) and \( \varepsilon_{3i} \) are Error term for each outlet.

The system of equations is jointly estimated using maximum likelihood method. The estimation was done using the user-written STATA mvprobit procedure (Capellari and Jenkins, 2003) that employs the Gewek-Hajivasiliou-keane smooth recursive conditioning simulator to evaluate the multivariate normal distribution (Train, 2003). The simulator was indicated (Capellari and Jenkins, 2003) that employs the Gewek-Hajivasiliou-keane smooth recursive conditioning simulator to evaluate the multivariate normal distribution (Train, 2003). The simulator was indicated (Capellari and Jenkins, 2003) that employs the Gewek-Hajivasiliou-keane smooth recursive conditioning simulator to evaluate the multivariate normal distribution (Train, 2003). The simulator was indicated (Capellari and Jenkins, 2003) that employs the Gewek-Hajivasiliou-keane smooth recursive conditioning simulator to evaluate the multivariate normal distribution (Train, 2003). The simulator was indicated (Capellari and Jenkins, 2003) that employs the Gewek-Hajivasiliou-keane smooth recursive conditioning simulator to evaluate the multivariate normal distribution (Train, 2003). The simulator was indicated (Capellari and Jenkins, 2003) that employs the Gewek-Hajivasiliou-keane smooth recursive conditioning simulator to evaluate the multivariate normal distribution (Train, 2003).

RESULT AND DISCUSSION

Demographic characteristics of households

This study is based on cross-sectional data collected from 184 teff producing households selected from three kebeles of Abay Chomen district. Table 1 below shows summary statistics for some variables in the data collected. In this study, the age of all respondents was between 36 and 67 years with mean of 44.625 years and a standard deviation of 6.25. The average family size of sampled respondents was found to be 3.658 with standard deviation of 1.346. The minimum and maximum family sizes were found to be 2 and 8, respectively. The study also revealed that the mean landholding size of the sampled households in the study area was 2.563 hectares with standard deviation of 1.165. The minimum and maximum landholdings sizes were 1 ha and 7 ha respectively. To reach to the main road from their home in the study area, it was found that the farmers walked on average 3.141kms with standard deviation of 1.523.

**Table 1**: Demographic characteristics of sample households

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std.</th>
<th>Min</th>
<th>Max</th>
<th>Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(years)</td>
<td>184</td>
<td>44.625</td>
<td>6.247</td>
<td>36</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Experience (years)</td>
<td>184</td>
<td>13.630</td>
<td>2.596</td>
<td>9</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sex (1=male, 0=female)</td>
<td>184</td>
<td>0.511</td>
<td>0.501</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Family size(number)</td>
<td>184</td>
<td>3.658</td>
<td>1.346</td>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Land size(hectare)</td>
<td>184</td>
<td>2.563</td>
<td>1.165</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Oxen owned (number)</td>
<td>184</td>
<td>2.717</td>
<td>0.921</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Extension contact (number per month)</td>
<td>184</td>
<td>4.739</td>
<td>1.292</td>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Residence distance (km)</td>
<td>184</td>
<td>3.141</td>
<td>1.523</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Education status(grade)</td>
<td>184</td>
<td>2.174</td>
<td>1.057</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Teff produced (quintal i.e 100kg)</td>
<td>184</td>
<td>5.332</td>
<td>2.614</td>
<td>1</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

**Source**: Survey result, 2016

Table 2 presents the characteristics of sample households by market outlets participation status. About 102 households were reported that they sold their teff at farm gate, about 105 of them sold at retailer and 126 of them sold their teff at wholesalers.

**Table 2**: Characteristics of sample households by market outlet choices

<table>
<thead>
<tr>
<th>Variables</th>
<th>Farm gate</th>
<th>Retailer</th>
<th>Wholesaler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age(years)</td>
<td>Yes(102)</td>
<td>No(82)</td>
<td>Yes(105)</td>
</tr>
<tr>
<td></td>
<td>46.108</td>
<td>42.780</td>
<td>46.038</td>
</tr>
<tr>
<td>Family size(number)</td>
<td>3.598</td>
<td>3.732</td>
<td>3.610</td>
</tr>
<tr>
<td>Land size(hectare)</td>
<td>2.417</td>
<td>2.744</td>
<td>2.510</td>
</tr>
<tr>
<td>Oxen owned (number)</td>
<td>2.706</td>
<td>2.732</td>
<td>2.638</td>
</tr>
<tr>
<td>Extension contact (number per month)</td>
<td>4.745</td>
<td>4.732</td>
<td>4.733</td>
</tr>
<tr>
<td>Residence distance (km)</td>
<td>0.647</td>
<td>0.646</td>
<td>0.638</td>
</tr>
<tr>
<td>Education status (grade)</td>
<td>3.108</td>
<td>3.183</td>
<td>2.971</td>
</tr>
<tr>
<td>Teff produced (quintal i.e 100kg)</td>
<td>2.176</td>
<td>2.171</td>
<td>2.229</td>
</tr>
</tbody>
</table>

**Source**: Survey result, 2016
Marketing Channels of Teff

Teff is a cash crop that passes through the hands of many intermediaries. Based on the direction of flow and volume of Teff transacted, seven marketing channels were identified. The channel starts from the producers (farmers) and ends in the terminal market. According to producers survey which involves 184 respondents in the three study kebeles in the year 2016 about 506 quintals of Teff was marketed.

A marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final destination. The result revealed that, from the total of 982qt. produced, 51.58 % (506qt) was supplied to the market through the seven identified channels.

The major Marketing channel known in the study area is described as follows.
I. Producers → Consumers (14qt.)
II. Producers → Collectors → Rural wholesalers
   → Broker → Consumers (59qt)
III. Producers → Collectors → Wholesalers
   → Broker → Urban wholesaler → Retailers
   → Consumers (123qt)
IV. Producers → Rural wholesalers → Brokers
V. Producers → Rural wholesalers → Brokers
Consumers (98qt).

Determinants of Teff market outlet choices

A Multivariate probit model was used to estimate three binary dependent variables namely farm gate, retailers and wholesalers market outlet because of these are the dominant outlets. The commodity is mainly produced for both sale and consumption. The P-value of the Wald test statistics for the overall significance of the regression is low (p value = 0.0000) indicating that the multivariate probit is significant. Further, the likelihood ratio test of rho is significant (P-value = 0.0001) indicating that a multivariate probit specification fits the data. The significance of the off-diagonal elements of the covariance matrix shows that there are unobserved heterogeneities that influence the choice decisions on the different market outlets.

The correlation coefficients among the error terms are significant indicating that the decision to choose one market outlet affects the decision of choosing the other. The correlation coefficients between the farm gate and retailers and farm gate and wholesaler market outlets is negative and significant at 5% level indicating that farmers who choose one market outlet are less likely to choose another. All of the interpretation for the multivariate probit model result for Teff outlet choice is presented in the next table.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Farm gate</th>
<th>Retailer</th>
<th>Wholesaler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>0.067***</td>
<td>0.018</td>
<td>0.000</td>
</tr>
<tr>
<td>Experience (years)</td>
<td>0.005</td>
<td>0.039</td>
<td>0.899</td>
</tr>
<tr>
<td>Sex (0=female, 1=male)</td>
<td>0.479**</td>
<td>0.208</td>
<td>0.021</td>
</tr>
<tr>
<td>Family size (number)</td>
<td>-0.046</td>
<td>0.076</td>
<td>0.543</td>
</tr>
<tr>
<td>Land size (hectare)</td>
<td>-0.193**</td>
<td>0.086</td>
<td>0.025</td>
</tr>
<tr>
<td>Oxen (number)</td>
<td>0.002</td>
<td>0.110</td>
<td>0.987</td>
</tr>
<tr>
<td>Extension contact (number)</td>
<td>-0.039</td>
<td>0.078</td>
<td>0.618</td>
</tr>
<tr>
<td>Market information</td>
<td>-0.191</td>
<td>0.218</td>
<td>0.381</td>
</tr>
<tr>
<td>(0=no, 1=yes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residence distance(Km)</td>
<td>-0.048</td>
<td>0.068</td>
<td>0.473</td>
</tr>
<tr>
<td>Education level(Grade)</td>
<td>0.093</td>
<td>0.096</td>
<td>0.328</td>
</tr>
<tr>
<td>Teff produced(quintal)</td>
<td>-0.151***</td>
<td>0.049</td>
<td>0.002</td>
</tr>
<tr>
<td>cons</td>
<td>-1.422</td>
<td>1.127</td>
<td>0.207</td>
</tr>
</tbody>
</table>

N=184, Wald chi2 (33) = 62.23, Prob > chi2 = 0.0015, Likelihood = -286.30878, rho21 = rho31 = rho32 = 0; Where, 1, 2, 3, stands for farm gate, retailer and wholesalers respectively and ***, **, * represents level of significance at 1%, 5%, and 10% respectively.

Source: Mvpt model result, 2016
The result implies that, the probability of choosing farm gate market outlet was influenced by age, sex, land size and quantity of teff produced at different level of significance.

The probability of choosing farm gate market outlet was determined by age at 1% significance level. This implies that older households prefer to sell their product to farm gate market outlets than retailers and wholesalers as compared to younger households.

The probability of choosing cooperatives, market outlet was determined by quantity of Teff produced at 1% significance level. This is due to the fact that farmers those who produce large quantity of Teff increase the probability to choose cooperative outlet rather than collectors since the price of cooperative is greater than collector price in the study area. The study by Emana et al. (2015) also indicated that large volume of sales motivates households to prioritize the channels and decide to use the best alternative.

The probability of choosing wholesaler outlet is positively affected by quantity produced and times of sale at 1% significance level. This explained that, those farmers who produce large quantity of Teff, the probability to sale his product to wholesalers also increase by increasing their bargaining power. This result is consistent with the result from a study by Emana et al. (2015) has positive relationship with the likelihood of choosing wholesalers channel. At the same time, those farmers who store Teff in his/her home until price rise or to sale late of the year also choose wholesaler outlet than other outlet and get high benefit from the sale of Teff. Again, the probability to choose wholesaler market outlet were influenced by frequency of extension contact and market information positively at 5% significance level. Implies that as producers regularly contact with DA’s he/she improve his/her knowledge and skill on Teff production and marketing thus increase volume of Teff produced and strengthen their bargaining power thus increase the probability to choose wholesaler market outlet choice.

**CONCLUSION AND RECOMMENDATIONS**

The result of multivariate probit model indicated that the probability to choose farm gate collector outlet was affected by age, sex, land size and quantity of teff produced compared to retailers and wholesaler outlet. Similarly, the probability of choosing retailer market outlet was affected by quantity produced, and age of the households at 1% significance level compared to farm gate collectors and wholesaler outlet. The probability of choosing wholesaler market outlet was affected by age and education level at 5% significance level compared to farmgate collectors and retailers market outlet.

The recommendations are drawn from this study based on the significant variables from the analysis. Strong intervention could be taken by government to upgrade producers through improving trade regulation of teff and shorten its marketing channels.

Determinants of teff market outlets choice were analyzed by Multivariate probit model. The result indicated that the outlet choice of farm gate was positively and significantly determined by age and sex and positively influenced by land size and quantity of teff produced.

**REFERENCES**


**Accepted 30 January 2018**


**Copyright:** © 2018 Bekele and Hirko. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are cited.