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A Multinomial Logit Analysis of Market Outlet Choice for Major Vegetables Crop: Evidence from Smallholder Farmers' of Ambo and Toke-Kutaye Districts, West Shewa, Ethiopia

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This study was initiated to investigate factors affecting market outlet choices by smallholder farmers' in Ambo and Toke-Kutaye districts. A total of 150 sample households were randomly selected for an interview using a semi-structured questionnaire. The Descriptive statistics and multinomial logit regression model were used for data analysis. Hence, 49.33% of sampled respondents choice direct sell to market while the remaining 31.33% and 19.33% of respondents choice wholesaler and retailer channel respectively. On the other hand, the multinomial logit regression analysis result showed that family size and access to market negatively affecting choice of retailer channel. Similarly, dummy model farmer, education level, and access to credit decrease the probability choice of retailer channel while it increases probability choice of wholesaler channel. Livestock in TLU and access to market decreases the probability choice of wholesaler channel. Finally, the study suggested that being model farmer, allocating more land for vegetables production, efficient use of family labor, access to market, and access to credit services would help to enhance smallholders capacity to produce vegetables that aligned to improve vegetables value chain in the study areas.
Keywords: Market Outlet Choice, Vegetables, Multinomila logit, Smallholder Farmers', Study Areas

INTRODUCTION

Marketing of vegetables crops has paramount opportunities and challenges for smallholder farmers. Since the majority of smallholder farmers have subsistence production, marketing is underdeveloped and inefficient (MoFED, 2010). The lack of adequate storage facilities constitute another constraint to both marketing and food security and, large quantities of agricultural commodities produced by farmers tend to rot away un-marketed, further the raising of productivity by smallholder farmers has been the inability of most them to get linked into the super market chains (Kamara et al., 2002).

Ethiopia has a variety of vegetable crops grown in different agro ecological zones produced through commercial as well as small farmers both as a source of income as well as food. Hence, on average more than 2, 3999,566 million of tons of vegetables and fruits are produced by public and private commercial firms (EIA, 2012). According to the CSA report during the year of 2014/15 of *mehere* (winter) season, the volume of vegetables crop produced and the area covered for production is 884,849.36 quintals and 6,779.23 hectares respectively. Out of this volume, onion took the share of 1,645.03 quintals (0.24%) and 1,211.27 hectares and tomato shared 549,615.15 quintals (0.67%) and 6,779.23 hectare of land (CSA 2015).

Having this potential, in the study areas vegetables like Tomato and Onion are widely grown and marketed. Farmers produce in two seasons using irrigation water and rainfall. Vegetables production in the study areas was constrained by shortage of seeds/planting materials, diseases and insect pests, poor postharvest handling and poor linkage to market and market information (Bezabih et al. 2014). Perhaps vegetables like tomato and onion attract good price, but suffer from high price volatility. Particularly with producers and traders revealed that the existing market condition and production planning doesn't suit the nature of vegetable products where farmers reported extremely low prices particularly for onion and tomato. So that on stand selling is common by brokers and wholesalers. Therefore, this study tried to address households' decision to choose market outlet for vegetables marketing by answering the following specific objectives to:

- ✓ describe the socio-economic and institutional factors of vegetables producers and;
- ✓ Estimate determinants of smallholder farmers' choice of major vegetables (tomato and onion) market outlet.

METHODOLOGY

Description of the Study Areas

This study was carried out in Ambo and Toke Kutaye districts of West Shewa zone of Oromia National Regional State. *Ambo district* is situated at 8°56'30" - 8°59'30" N latitude and 37° 47'30" -37°55'15" E longitude in central Oromia, Ethiopia, 110 km west of Addis Ababa. The district has 34 rural kebeles of which 23 of them are vegetable producers, and Ambo is the capital of the district. The 2007 national census reported total populations for this district is 108,406, of whom 54,186 (49.98%) were men and 54,220 (50.01%) were women (CSA, 2007). On the other hand, *Toke Kuatye* is located between latitude of 08° 59' 01.1' N and longitude of 37° 46' 27.6' E.

The district has 31 rural kebeles of which 28 of them are vegetables producer, and *Guder* is the capital town. The total human population of the district is 119,999, of which 59,798 (49.83%) were men and 60,201 (50.17%) were women; and 15,952 or 13.29% of its population were urban dwellers (CSA, 2007).

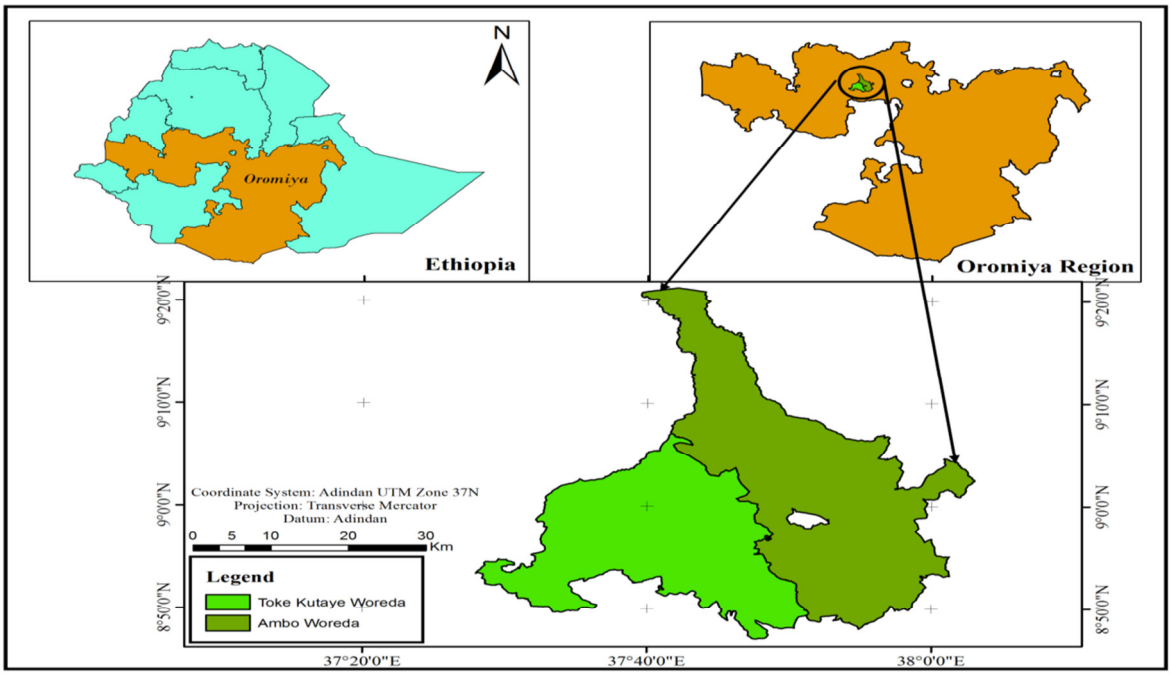

Figure 1. Map of the Study Areas (*Source: College of Agriculture, & Veterinary Science GIS laboratory*)

Major vegetables production and types irrigation systems in the study areas

Vegetables production is carried out in 28 and 23 kebeles of the Toke-Kutaye and Ambo district using irrigation water respectively. Among these kebeles, *Imala-Dawoo-Aajo*, *Birbirsa*, *Billo* and *Kiba* are ranked as the most widely vegetables producer. Hence, the modes of irrigation practices in the districts are traditional, motor pump, modern irrigation scheme and water harvesting. For instance, there are 80 motor pumps and 20 modern irrigation schemes in Toke-Kutaye that are used by the farmers. The practice of traditional irrigation system is based on accessibility to water and farm field is irrigated using family labor. While farmers form a group of 5-6 and lay-out certain rules that function to use fairly the resource and settle conflict of interest. They purchase motor pump in group by raising their own fund and harvest water communally on the basis of their group and use shifting time of irrigating their fields. In Toke-Kutaye there are more beneficiaries on modern irrigation than Ambo ditrsict while there are large numbers of farmers in Ambo who still depend on traditional irrigation farming (Table 1).

Table 1. Types of Irrigation Practices by Districts

S/N	*Types of Irrigation Practice*	*Total irrigable vegetable land in hectare by district*		*Total beneficiaries (Households)by district*	
		Toke-Kutaye	*Ambo*	*Toke-Kutaye*	*Ambo*
1	Modern Irrigation System	1,495.5 (43.56%)	500.5 (13.38%)	3,461(53.23%)	2,685 (16.94%)
2	Traditional Irrigation System	1,618.25 (47.14%)	2747.4(73.46%)	2,457 (37.79)	10,734(67.71%)
3	Motor Pump Irrigation system	319 (9.30%)	492 (13.16%)	584(8.98%)	2434(15.35%)
Total		***3,432.75***	***3,739.9***	***6,502***	***15,853***

Source: Ambo and Toke-Kutaye Districts Agricultural Office (DAO), 2016

Moreover, the two districts have potential to produce different types of vegetables crop. Two season vegetables production using irrigation water and rain-fed is the predominant one. Tomato is dominantly produced in Toke-Kutaye district while cabbage is relatively the least. On the other hand, onion is largely produced in Ambo district. It is pertinent that, farmers pretended to produce following one another rather than market driven. Generally, the following are the major vegetables crop produced by year 2016/17 in Ambo and Toke-Kutaye districts.

Table 2. Major Vegetables Produced in the Study Areas

S/N	*Major Vegetables crop*	*Total cultivated area (in ha)*		*District level per hectare productivity(in quintals)*	
		Toke-Kutaye	*Ambo*	*Toke-Kutaye*	*Ambo*
1	Tomato	142,290	27,867	153	130
2	Onion	139,647	37,813.5	149	135
3	Irish Potato	100,980	160,643.9	153	158
4	Cabbage	44,928	32,432.4	108	108

Source: Ambo and Toke-Kutaye District Agricultural Office (DAO), 2016

Sampling Techniques and Procedures

For this study, three-stage sampling technique was employed. In the first case, sample districts were selected purposively based on the potential production of vegetables crops. Secondly, out of 23 and 28 kebeles of potential vegetable producers from Ambo and Toke Kutaye districts, 4 kebeles were selected based on their potential vegetables production namely *Kiba*, and *Billo*from*Ambo*, and *Imala DawoAajo* and *Birbirsa* from *Toke Kutaye*. Thirdly, 82 and 68 farm households (irrigation beneficiaries) were selected from Ambo and Toke-Kutaye district respectively based on Probability Proportional to Sample size using Yamane formula that resulted to 150 sample households (Yamane, 1967) i.e.

$n=\frac{N}{1+N(e^2)}$; Here the sampling error is 8% (0.08) considering the budget, accuracy and time utilization for the research.

Table 3. Summary of Sample Kebeles by Respective Sample Households

S/N	*District*	*Sampled Kebele*	*Total Irrigation Vegetable producers*	*Sample Size using PPS*
1	Ambo	Billo	809	35
		Kiba	610	26
2	Toke-Kutaye	ImalaDawoAajo	1585	68
		Birbirsa	496	21
Total			**3,500**	**150**

Methods of Data Collection and Data Sources

In this study, both primary and secondary data was used. To secure primary data, a semi-structured questionnaire was employed. The questionnaire was designed to capture information on household socio-economic characteristics, institutional factors, market information services variables and other major vegetables (Onion and Tomato) marketing related factors were included. Before conducting the survey data collection, pre-testing questionnaire was carried out. Thus, further revision was made in assuring the incorporation and deletion of the necessary and unnecessary factors. In addition, personal observation and focus group discussions were used to supplement information collected from respondents. Secondary data was also collected from District Agricultural Office (DAO) and other sources.

Methods of Data Analysis

Descriptive analysis

The descriptive statistics such as frequency and percentages was used to describe households' specific characteristics, wealth characteristics and institutional characteristics of vegetables producers.

Econometric Analysis

It is known that farmers' decision to choice one market outlet or another is categorized as a function of a set of incentives and capacity that allow the fulfillment of individuals demand. Given that we have formulated channel selection as a three‐alternative choice (direct channel, retailer channel and wholesaler channel.). We have applied the multinomial logit model to estimate marketing channel choice with discrete dependent variable. According to rational choice theory, we assume individuals choice mutually exclusive alternative marketing channels to maximize utility and will choose the channel with maximum expected utility given their socio‐economic and demographic characteristics and relevant resource constraints.

The producer's market channel choice can be conceptualized using a random utility model (RUM). RUM is particularly appropriate for modeling discrete choice decisions such as between market channels. It is an indirect utility function where an individual with specific characteristics associates an average utility level with each alternative market channel in a choice set. In our sample, smallholder farmers' did sell vegetables product using

different channels. Producers are mapped into three mutually exclusive channels: direct channel, Retailer channel and Wholesaler channel.

Let decision - maker choose from a set of mutually exclusive alternatives, j = 1, 2, …., J. The decision - maker obtains a certain level of utility U_{ij} from each alternative. The discrete choice model is based on the principle of that the decision - maker chooses the outcome that maximizes the utility. The smallholder farmers make a marginal benefit - marginal cost calculation based on the utility achieved by selling to a market channel or to another. We do not observe his/her utility, but observe some attributes of the alternatives as faced by the decision - maker. Hence, the utility is decomposed into deterministic (V*ij*) and random (ε *ij*) part:

$$Uij=Vij+\varepsilon ij \forall ijN \quad (1)$$

A smallholder farmer selects market channel j=1 if

$$Uik>Uk \quad (2)$$

Where U_{ik}denotes a random utility associated with the market channel j=k, and V*ij*is an index function denoting the smallholder farmers' average utility associated with this alternative. The second term ε*ij*denotes a random error which is specific to a producer's utility preference (McFadden, 1974). Now, in our implementation model, market channel choice is modeled as:

$$Mij=\beta j\ Xij+\varepsilon ij \quad (3)$$

Where *Mij*is a vector of the marketing choices (j = 1 for Direct channel; 2 for Retailer channel; and 3 for wholesaler channel ofith smallholder farmer, β*j* is a vector of channel - specific parameters. ε*ij*is the error term assumed to have a distribution with mean 0 and variance 1. *Xij*is a vector of smallholder farmers' characteristics that together reflect the incentive, risks, capacity variables and other shifters influencing the producer's indirect utility, and hence his/her market channel decision.

Let Y be the unordered categorical dependent variable that takes on a value of zero or one for each of the *J* choices. The model for choice of supply channel can be given by:

$$\Pr\ (Y_i = j) = \frac{\exp\ (\beta_j{}' X_i)}{\sum_{j=0}^{J} \exp\ (\beta_j{}' X_i)} \text{ for } j = 1,2,3 \quad (4)$$

Where:

- $\Pr(Y_i = j)$ is the probability of choosing either direct channel, retailer channel and wholesaler channel th direct channel as the reference supply channel strategy category,
- J is the number of supply channel in the choice set,
- j = 1 is direct channel, j= 2 is retailer channel, j = 3 is wholesaler channel.
- X_i is a vector of explanatory factors conditioning the choice of the jth alternatives,
- β is a vector of the estimated parameter.

The estimated equations provide a set of probabilities for the *J* + 1 choice restricted for a decision maker with characteristics. In order to remove an indeterminacy in the model, a convenient normalization that solves the problem is β0 = 0. Therefore, one can define the general form of the probability that individual ith choose the alternative jth in the following way:

$$\Pr\ (Y_i = j\ /\ X_i) = \frac{\exp\ (\beta'\ j\ X_i)}{1 + \sum_{j=0}^{J} \exp\ (\beta'_j\ X_i)'} \quad \text{for all } j>0 \quad (5)$$

The MNL coefficients are difficult to interpret and associating the *βj* with the *j* th outcome is tempting and misleading. To interpret the effects of explanatory variables on the probabilities, marginal effects are usually used and derived as (Greene, 2003):

$$\delta_j = \frac{\partial P_j}{\partial X_j} = P_j\left[\beta_j - \sum_{j=1}^{j} P_j\beta_j\right] = p_j\left[\beta_j - \bar{\beta}\right] \quad (6)$$

The marginal effects measure the expected change in probability of a particular outcome being made with respect to a unit change in an explanatory variable (Greene, 2003).

Table 4. Summary of the Variables and Expected sign for Multinomial logit Model

			Dependent variable = Choice of Market Outlet		
Independent variables	**Variables Code**	**Type of variables**	**Direct Channel**	**Retailer channel**	**Wholesaler channel**
Age of the respondent	AGE	Continuous	+	+	-
Sex (1=male;0=female)	SEX	Dummy	-	-	+
Educational level in years of schooling	EDUCA	Continuous	-	-	+
Adult number of Family size	FMSIZE	Discrete	-	+	+
Access to market(1=yes;0=No)	ACMARKET	Dummy	+	+	+
Membership of cooperative	MEMCOP	Dummy	-	-	+
Owning Donkey for transportation(1=Yes;0;No)	OWDONKEY	Dummy	-	-	+
Distance from Main Public Road in time	DISROAD	Continuous	-	-	-
Number of livestock in TLU	LIVSTOCK	Continuous	+	+	-
Access to Credit Services (1=yes; otherwise '0')	ACREDIT	Dummy	-	+	+
Village level Status of the HH (1=model farmer; otherwise '0'	VLSHH	Dummy	-	-	+

RESULT AND DISCUSSION

Vegetables Market Outlet Choice in the Study Areas

Farmers choose different market outlet to supply their vegetables product. The identified vegetables supply channel is direct sell to market retailer and wholesaler. Thus, 49.33% (n=74) of rural vegetable producer of the study areas sell their vegetables directly to the available local market where as the remaining 19.33% (n=29) and 31.33% (n= 47) were supplied their vegetables through the retailers and wholesaler channels respectively (Table 5).

Table 5. Percentages of Households by Vegetables Market Outlet

Vegetables market outlet	**Districts**				**Total**	
	Ambo		**Toke-Kutaye**			
	Freq.	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
Directly sell to market	49	59.76	25	36.76	74	49.33
Retailers	10	12.19	19	27.94	29	19.33
Wholesaler	23	28.05	24	35.30	47	31.33
Total	**82**	**100**	**68**	**100**	**150**	**100**

Source: Own survey data (2016/17)

Socio- Economic Characteristics of the Households

As depicted in Table 6, the large number of respondents fall in age category between 35-45 years in which 46.34% (n=38) of them were from Ambo district, 35.29% (n=24) from Toke-Kutaye and 41.33% (n=62) for the whole sample. We have similar figure and percentage result for the lower and upper age category for whole sample. However, we found high number of respondents' age between 25-35 years in Ambo district and lower age figure in Toke-Kutaye district. In addition, the upper age category above 55 years was higher in Toke-kutaye district as compared to Ambo district.

From the total of 150 sample households, male households were 84 %(n=126) and females were 16 %(n=24). We observed equal number of males in both study areas. The female households were larger in Ambo relative to Toke-Kutaye district. In addition, the majority of the households were literate while smaller numbers of households were illiterate. Generally, in both districts there was insignificant difference between number of literate and illiterate. On the other hand, on the basis of adopting full agricultural package and join for commercialization households were grouped into model farmer and non-model farmer and found 36.67 %(n=55) model farmer and 63.33 %(n=95) non-model farmer. We have large number of model and non-model farmers from Ambo district relative to Toke-kutaye district. Likewise, family size of the households also assessed and the large number of households have family size between 5 and 8 in number where as small number of households have more than 8 family members. Finally, households asset endowment such as oxen and land

holding were described accordingly, and 66.67 %(n=100) households have more than 1 *timad* of oxen and the remaining 32 % (n=48) and 1.33 %(n=2) households have 1 *timad* of oxen and no oxen respectively. On the other hand, 64.66 %(n=97) of households have more than 2 hectare of land where as 34.67 % (n=52) have between 1 and 2 hectare hence, 0.67% (n=1) have below 1 hectare of land.

Table 6. Socio-economic Characteristics of the Households

Socio-Economic Characteristics	Districts				Total (N=150)	
	Ambo (n=82)		Toke-Kutaye (n=68)			
	Freq	Percent	Freq.	Percent	Freq.	percent
Age Category						
25-35years	16	19.51	9	13.23	25	16.67
35-45Years	38	46.34	24	35.29	62	41.33
45-55years	18	21.95	19	27.94	37	24.67
≥ 55 years	10	12.19	16	23.53	26	17.33
Sex Category						
Male	63	76.83	63	92.65	126	84
Female	19	23.17	5	7.35	24	16
Educational level						
Basic education - 5 years	72	87.80	62	91.18	134	89.33
Illiterate	10	12.19	6	8.82	16	10.67
Household farm status						
Model Farmer	31	37.80	24	35.29	55	36.67
Non-Model Farmer	51	62.20	44	64.71	95	63.33
Family size category						
≤ 4 in number	27	32.93	12	17.65	39	26
5-8 in number	44	53.66	41	60.29	85	56.67
> 8 in number	11	13.41	15	22.06	26	17.33
Number of Oxen in *timad*						
No oxen	1	1.22	1	1.47	2	1.33
1 *timad* of Oxen	24	29.27	24	35.29	48	32
More than 1 *timad* of Oxen	57	69.51	43	63.23	100	66.67
Total Land Holding						
Less than 1 hectare	0	0	1	1.47	1	0.67
1- 2 hectare	39	47.56	13	19.12	52	34.67
More than 2 hectare	43	52.44	54	79.41	97	64.66

Source: Own computation data (2016/17).

Households access to institutional and infrastructure services

Institutional and infrastructure factors play significant role for vegetables producers. From the total respondents 73.33% (n=110) have access to irrigation agricultural extension services where as 26.67% (n=40) do not access to irrigation agricultural extension services. On the other hand, 94% (n= 141) and 6% (n= 9) have access to credit services. Finally, 76.67%(n=115), 54% (n=81) and 64% (n=96) were access to market place, membership of agricultural cooperative and access to public road showing that fortunate condition to produce vegetables. However, information from focus group discussion, justified that the lack of extension service on disease management damaging the quality vegetables (Table 7).

Table 7. Households Access to Institutional and Infrastructure Factors

Institutional and infrastructure	Yes		No		Total	
	Freq.	Percent	Freq.	Percent	Freq.	percent
Access to irrigation agricultural extension services (AIAEXT)	110	73.33	40	26.67	150	100
Access to credit services for vegetables production (ACREDIT)	141	94	9	6	150	100
Access to market place (ACMARKET)	115	76.67	35	23.33	150	100
Access to main public road (ACROAD)	96	64	54	36	150	100
Membership of agricultural cooperative (MEMCOP)	81	54	69	46	150	100

Source: Own survey data (2016/17)

Determinants of Market Outlet Choice for Major Vegetables

In the next econometric analysis, multinomial logit model (MNL) was employed to estimate the determinants of vegetable market outlet choice by households in setting three options of vegetable market outlet in the model. During the procedural estimation direct sell channel was tailored to the reference category based on highest rate of respondents' choice. We incorporate 12 explanatory variables in the model and interpreted at the marginal

effects. The goodness fit of the model is 0.013 which is significant at 5%. Likewise, heteroskedasticity and multicollinearity test was conducted for the variables used in the model and found no serious problem i.e. less than 10%.

Model Farmer (MOFARM): A dummy model farmer variable significantly determining the vegetables channel choice. Being a model farmer decreases the probability choice of retailer channel by 17.9% and increases the probability choice of wholesaler channel by 11.2%. This indicates that model farmer produces the bulk of major vegetables (onion and tomato) using given resources and farming experience. This may help to trap better market price and that induces to supply bulk vegetables product to wholesalers.

Educational status (EDUCA): The dummy educational status of the household is important variable affecting the vegetables market channel choice. Hence, literacy decreases the probability to choose the retailer channel for vegetables marketing and increases to choose wholesaler market channel. It is significant and affects retailer and wholesaler market channel choice at 10% and 1% probability level respectively. This may be due to literate households are more aware of market channel and able to get market information for their produce and helps to choose the best market channel that expected to give better price for their produce. The result in this finding is consistent to Abrahm, (2013), in his analysis of vegetables market outlet choice in Habro and Kombolcha districts.

Total Family Size (FMSIZE): It is positively affecting the probability choice of the retailer market channel and consistent with the hypothesis set. An increase in number of family member increases the probability choice of retailer market channel by 2.8% and significant at 10% probability level. This indicates that the more family size helps to supply vegetables to different retailer shops, restaurants and kiosks in different units which affects to operate vegetables production.

Total Number of Livestock Owned (TLIVSTOK): Livestock are important in contributing household income. The sign obtained for this variable also consistent with the hypothesis thus an increase in number of total livestock unit in TLU reduces the probability choice of wholesaler market channel by 2.4% and significant at 5% probability level. This may indicate that households who have more livestock allocate more of their land for grazing area and fodder production using irrigation water which tends to reduce land used for vegetable production. Information from group discussion confirmed that the shortage of open grazing land in the districts especially during winter season allows cattle to graze over wet part of their land. Hence, it reduces vegetables production at bulk that purchased by wholesalers.

Access to Credit Services (ACREDIT): The dummy access to credit services affect negatively the probability choice of retailer market channel. Access to credit services decreases the probability choice of retailer channel by 13.8% and significant at 1% probability level. The sign of the finding is opposite to the hypothesis indicating that credit is advantageous to produce the vegetables at bulk that rarely marketed to retailers. This shows that the more households acquire credit services, the more they increase scale of vegetables production. Because credit facilitate fortune condition to acquire inputs such as motor pump, water can and other inputs that leads to produce more vegetables (Onion and tomato) which attracts wholesaler. This result is consistent with Mebrat (2014) in which she obtained credit has positive effect in vegetables production in rift valley of Ethiopia.

Access to Local Market Area (ACMARKET): Due to their minimum shelf life as well as risk in product loss, vegetables production should be near to public road and market areas. Thus, dummy access to market area increases the probability choice of retailer market channel by 11.3% and significant at 5% probability level. This may indicate that the more households access to market area, the more diversify their vegetables production on their limit land and supply to retailers. This finding is contrary to Bezabih et al, 2015, who found negative sign for retailer channel in their study of potato value chain. On the other hand, access to local market area reduces the probability choice of wholesaler market channel by 21.3% and significant at 5% probability level. This may indicate that there may be land and water shortages to produce vegetables at large and given that all water users busy their schedule to water their vegetables farm field. The significant result obtained for wholesaler is opposite to (Shilpi and Umali, 2007; Sirak and Bahta, 2007) who obtain positive sign to the channel and similar to Tewodros (2014) in his market outlet analysis of chickpea in southern Ethiopia found negative sign for wholesale market participation.

Table 8. Marginal Effect Estimates at Mean from Multinomial Logit Model

Market Outlet Choice (Direct sale to market = reference category)						
Retailer Channel				**Wholesaler Channel**		
Variables	**dy/dx**	**Std.Err.**	**P>Z**	**dy/dx**	**Std.Err**	**P>Z**
MOFARM(d)	-0.179	0.076	0.019**	0.250	0.112	0.026**
AGE	-0.003	0.002	0.156	-0.009	0.003	0.782
SEX(d)	-0.039	0.070	0.577	0.008	0.093	0.924
EDUCA(d)	-0.259	0.138	0.060*	0.242	0.069	0.001***
FMSIZE	0.028	0.010	0.070*	-0.024	0.018	0.192
TLIVSTOK	0.006	0.008	0.298	-0.024	0.119	0.042**
ACREDIT(d)	-0.138	0.044	0.002***	0.031	0.092	0.736
ACMARKET(d)	0.111	0.047	0.019**	-0.213	0.099	0.033**
DISROAD	-0.048	0.046	0.300	0.002	0.021	0.918
MEMCOP(d)	-0.055	0.050	0.280	0.001	0.087	0.985
USDONKEY(d)	0.077	0.052	0.138	0.028	0.091	0.756

Source: own calculation from STATA ver. 13 (*) Significance levels of 10%, (**) Significance levels of 5%, (***) and Significance levels of 1%, (^{d}) dy/dx is for discrete change of dummy variable from 0 to 1

Conclusions

Identifying factors affecting vegetables farmers' market outlet choice is important for the development of vegetables value chain. The volume of vegetables production plus farmers' productive assets determines what channel to choose. Hence, the less the volume of vegetables produced the more they choose retailer and vice-versa. In general, farmers' status, wealth and institutional factors contribute a lot for marketing of vegetables. And most farmers directly sell to market and relative numbers of them choose wholesaler channel and followed by retailer channel. Therefore, the study can contribute literature that helps to develop vegetables value chain particular to the study areas.

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