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Full Length Research Paper

Analysis of Smallholders Farmers Head Cabbage Market Outlet Choice in Kofele and Kore districts, Ethiopia

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This study was aimed at analyzed market outlet choice of by smallholder farmers in Kofele and Kore districts, west Arsi zone, Oromia National Regional State, Ethiopia with the specific objectives of to identifying head cabbage market outlet and factors affecting outlet choice decisions of farm households. The data were collected from both primary and secondary sources. A two-stage random sampling procedure was used to select 120 sample head cabbage producers from both districts using probability proportional to size. Descriptive statistics and econometric model were used to analyze data. Multivariate probit model was used to analyze factors affecting smallholder farmers' market outlet choice. The primary data for this study were collected from 120 randomly selected farmers through application of appropriate statistical procedures. The most Head cabbage market outlet used by farmers in the study area was rural collectors, wholesalers, and retailers. Mostly of the producers sold head cabbage product at farm gate. Only small amount sold at market place by using donkey as transport. Producers are price takers and hardly negotiate the price due to perishable nature of the product, fear of post-harvest loss, in case the product is not sold. The multinomial probit model result indicated that the probability to choose the collector outlet was significantly affected by Woreda dummy, education level, family size, quantity of head cabbage produced and distances from nearest market center. Similarly, the probability of choosing wholesaler and retailer marketing outlet was affected by head cabbage farming experience, quantity of head cabbage produced and access to credit. Therefore, policy aiming at improving farmers' knowledge and experience on head cabbage production and marketing, encouraging formal education through extension service, improving productivity and volume sales of head cabbage, expanding accessibility of market infrastructure and strengthening supportive institutions like credit access are recommended.

Keywords: Market outlet choice, head cabbage, multinomial probit model, smallholder farmers, Kofele and Kore Districts.

INTRODUCTION

Agriculture is the most important sector in Ethiopia; it accounts for 46% of GDP, 80% of export value, and about 73% of employment. The sector still remains largely dominated by rain-fed subsistence farming by smallholders who cultivate an average land holding of less than a hectare. Although agriculture has a long history in the country's economy, development of the sector has been hampered by a range of constrains which include land degradation, low technological inputs, weak institutions, and lack of appropriate and effective agricultural policies and strategies (Aklilu, 2015).

Horticultural crops play a significant role in developing countries like Ethiopia, both in income and social spheres for improving income and nutrition status. Further, it provides employment opportunities as their management being labour intensive, production of these commodities should be encouraged in labour abundant and capital scarce countries like Ethiopia (Girma, n.d).

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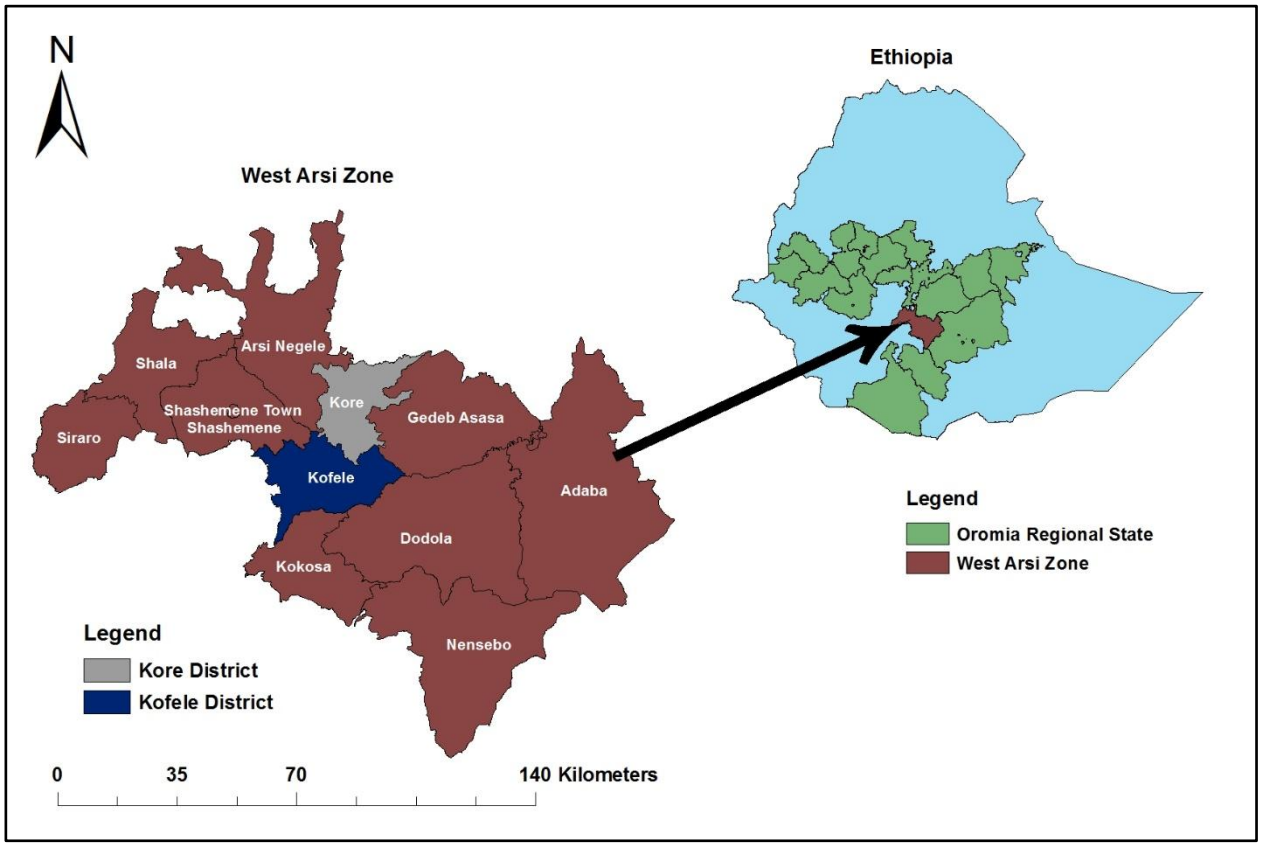

Figure 1: Location map of the study areas

Table 1: Socio-economic characteristics of respondent farmers for continuous variable

Variables	Measurement	mean ± SD
Age	Years	37.33 ± 10.55
Family size	Number	8.67± 3.34
Farming experience	Years	5.78± 3.84
Farm size	Ha	2.56± 1.49
Land size allocated for Head cabbage	Ha	0.42± 0.32
Distance from nearest market	Km	1.55± 1.34

Source: survey Result (2016)

Vegetable production is becoming an increasingly important activity in the agricultural sector of the country mainly due to increased emphasis of the government on the commercialization of smallholder farmers (Hailegiorgis and Hagos, 2016). Integrating vegetable production into a farming system has contributes substantially to the Ethiopia's economy in terms of food and nutrition security as the vegetables complement stable foods for a balanced diet by providing vitamins and minerals (Bezabih *et al*., 2015). Head cabbage is one of economically important vegetables in the country which grows best under cool conditions. According to CSA (2014), annual head cabbage production (in quintal) and area under production (in hectare) has increased by about 16 and 30 percent, respectively, from 2012/13 to 2013/14. Report from Office of Agriculture and Rural Development of respective districts (OoARD, 2013b) shows that head cabbage is widely produced and marketed in Kofele and Kore districts of West Arsi Zone, Oromia Regional State. The significantly increasing vegetable production in general and head cabbage in particular indicates that smallholders may have better surplus for market.

Despite the increasing importance of vegetables in the country as well as in the study area, the development of horticulture in general and vegetable production and marketing in Ethiopia in particular is constrained by a number of factors: Policy implementation gap, inadequate vegetable seed regulatory frameworks, inadequate quality control and certification mechanisms, limited public institutional capacity and capability supporting efficient and regular vegetable seed supply, inefficient

Table 2: Socio-economic characteristics of respondent farmers for dummy variables

Variables		Frequency	Percentage
Members of cooperative	Yes	117	97.5
	No	3	2.5
Sex	Male	105	87.5
	Female	15	12.5
Education	Literate	99	82.5
	Illiterate	21	17.5
Credit services	Yes	36	30.0
	No	84	70.0
Extension services	Yes	82	68.3
	No	38	31.7
Market information	Yes	116	96.7
	No	4	3.3

Source: survey Result (2016)

Table 4: Average head cabbage market supply

	Kofele (N=60)		**Kore (N=60)**		**Total (N=120)**		**t-test**	**p-value**
Head cabbage	Mean	SD	Mean	SD	Mean	SD		
Amount supply for market	62.42	39.25	37.97	18.64	50.19	32.97	4.35	0.000

seed importation and distribution system, high post-harvest losses, high incidence of diseases and insect pests, poor vegetable marketing and value chain development and weak linkage and integration among stakeholders (Bezabih *et al*., 2014).

According to Bezabih and Hadera (2007), production of horticultural crops is seasonal and price is inversely related to supply. During the peak supply period, prices decline and vice versa. The situation is worsened by the perishability of the products and poor storage facilities. Thus, 25% of the product is spoiled along the marketing channel. The marketing of vegetables in Eastern Ethiopia is characterized by seasonal gluts and shortages which in turn affect the marketing behavior of producers, traders and consumers (Jemma, 2008).

A review of literature in agro-industry value chain in Ethiopia indicates that the sector faces many challenges due to limited market outlets, limited efforts in market linkage activities and poor market information among actors (Dereje, 2007; Kaleb, 2008; Dendena *et al*., 2009). Correspondingly Mamo (2009), argued that small scale, dispersed and unorganized producers are unlikely to exploit market opportunities as they cannot attain the necessary economies of scale and lack bargaining power in negotiating prices.

Even though some related studies were carried out in different regions of the country, such study that provides empirical evidence for improving the production and marketing of head cabbage has not been undertaken in the study area. Therefore, there is a strong need to identify factors affecting producers' market outlets choice.

Objective

To identify head cabbage market outlet

To identify the determinants of market outlets choice decisions of head cabbage producers.

METHODOLOGY

The study area

This study was carried out in Kofele and Kore districts of West Arsi Zone, Oromia Regional State. West Arsi Zone is one of the 18 administrative zones under Oromia Regional State (the region accounting for about 34 percent of the country's total area) and it is divided into 11 districts (Fig. 1). Of the districts located in the zone, Kofele and Kore districts cover for about 5.3 (663 square kilometer) and 4.2 percent (533 square kilometer), respectively, of the zone's total area. According to CSA's (2013) population projection of the country, total population of these districts, respectively, is estimated to be 216,159 and 124,556 in 2014 with most population residing in rural areas.

According to the traditional classification system of climatic zones of Ethiopia cited in Deressa *et al.* (2010), agro-ecology of the study areas is dominantly highlands with altitude ranges from 2550 to 3150meter above sea level (masl). The annual rainfall ranges between 1800 and 2700 mm with bi-modal rainfall distribution. The main rainy season, '*Ganna/Meher'* extends from June to September/October and short rainy season, '*arfasa/Belg'*, covers the time between March/April and May (OoARD, 2013b). The average daily minimum and maximum temperatures of both districts are 17 - 19^0C and 22 - 23^0C, respectively.

The study districts are characterized by crop-livestock mixed farming system dominated by smallholders who

Table 1: Multivariate probit estimations for determinates of head cabbage producers outlets choice

Variables	Collectors			Wholesalers			Retailers		
	Coef.	Robust SE.	P>z	Coef.	Robust SE.	P>z	Coef.	Robust SE.	P>z
WOREDA	4.155***	1.340	0.002	-0.985	0.652	0.131	0.985	0.652	0.131
AGE	-0.099	0.046	0.290	-0.008	0.030	0.790	0.008	0.030	0.790
SEX	1.600	1.202	0.183	-0.331	0.719	0.645	0.331	0.718	0.645
EDU	-2.283**	0.922	0.013	-0.120	0.785	0.879	0.120	0.785	0.879
Farm experience	-0.410	0.621	0.509	0.709*	0.406	0.081	-0.709*	0 .406	0.081
Family Size	0.369 ***	0.125	0.003	-0.048	0.088	0.585	0.048	0.087	0.585
TA	-0.898	2.465	0.716	-2.082	1.526	0.172	2.082	1.526	0.172
lnPRod	-5.545***	0.997	0.000	2.505***	0.621	0.000	-2.505***	0.621	0.000
Market Price	0.173	0.604	0.775	0.120	0.411	0.770	-0.120	0.411	0.770
MKTINFO	0.359	1.447	0.804	1.239	1.003	0.217	-1.239	1.003	0.217
DISTANCE	-0.421*	0.225	0.061	-0.057	0.124	0.650	0.057	0.124	0.650
EXTENSION	1.615	0.974	0.970	-0.084	0.562	0.882	0.084	0.562	0.882
CREDIT	1.244	0.823	0.130	-1.465**	0.702	0.037	1.465**	0.702	0.037
Constant	17.607***	4.687	0.000	-10.425***	3.904	0.008	10.425***	3.904	0.008
Predicted probability	0.3803			0.9040			0.1854		
Joint Probability(Success)	0.043								
Joint Probability (Failure)	0.034								
Number Of Draws (#)	5								
Observations	120								
Log Likelihood	-37.503								
Wald(χ2(13)	3299.71								
Prob > χ2	0.0000***								
Estimated Correlation Matrix									
		ρ_1		ρ_2			ρ_3		
ρ_1	1.0000								
ρ_2	0.0644			1.0000					
ρ_3	-0.3533			-0.3551***			1.0000		
Likelihood Ratio Test of: $\rho_{21} = \rho_{31} = \rho_{32} = 0$									
$\chi^2(3) = 8.039$									
Prob > χ^2 = 0.0452**									

Note: *, ** and *** indicate statistical significance at 10, 5 and 1%, respectively. RSE is robust standard error, Y1=Collector, Y2=Wholesaler and Y3=retailer

integrate rain-fed crop cultivation and low input-output livestock production. Baseline information from Offices of Agriculture and Rural Development (OoARD, 2013b) indicates that agriculture, both crop and livestock production, is the major source of livelihood for most households (65 and 77 percent, respectively, in Kofele and Kore) followed by non-farm and off-farm activities. Crops including barley, wheat, maize, faba bean, pea and linseed are grown in these districts. Potato and head cabbage are also vegetables grown in the study areas for household consumption and income generation.

Sampling, data collection and statistical analysis

A two-stage sampling procedure was used to select sample households for this study. First stage, three potential head cabbage producer kebeles were selected from each districts namely, Shire kombolcha, Bole Hilensaa and Doda Dayu from Kore district and Wamagn Alkaso, Koma Bitacha and Germama from Kofale District based on the information obtain from secondary data and with collaboration of each woredas agricultural office experts. Second stage, a total of 120 households was randomly selected from list of smallholder farmers who are involved in head cabbage production using probability proportional to size method.

Data were gathered from both primary and secondary sources.

Primary data were gathered from selected households, traders (including collectors, wholesalers and retailers), and consumers using pre-tested questionnaires and checklists. Secondary data which is relevant for the present study were also collected from Offices of Agriculture and Rural Development (OoARD),

the Central Statistical Agency (CSA), and from published and unpublished sources.
Data were analyzed using STATA version 13, and the results were presented using descriptive statistics such as frequency, mean, standard deviation and percentage. Two-sample t-test was also used to compare the mean differences between the two districts on different variables.

Econometrics Analysis

This part of the analysis deals with the understanding of determinants of head cabbage producer's decisions of market outlet choice. A categorical dependent variable measured by the probability of producers sells head cabbage to either of the alternatives market outlets. It was represented in the model as Y1 for those households who choose to sell head cabbage to collectors, Y2 for producers who choose wholesalers, Y3 for producers who choose retailers.
Multinomial models are appropriate when individuals can choose only one outcome from among the set of mutually exclusive, collectively exhaustive alternatives. However, in this study producer's market outlets choice are not mutually exclusive; considering the possibility of simultaneous choices of outlets and the potential correlations among these market outlets choice decisions. Multivariate probit model was applied for household variation in the choice of a market outlet and to estimate several correlated binary outcomes jointly. Multivariate probit approach simultaneously models the influence of the set of explanatory variables on choice of markets outlets, while allowing for the potential correlations between unobserved disturbances, as well as the relationships between the choices of different market outlets (Belderbos *et al*., 2004, cited in Hailemariam *et al*., 2012).

The observed outcome of market outlet choice can be modeled following random utility formulation. Consider the i^{th} farm household (i=1, 2….. N), facing a decision problem on whether or not to choose available market outlets. Let U_0 represent the benefits to the farmer who chooses collector, and let U_k represent the benefit of farmer to choose the K_{th} market outlet: where K denotes choice of collector (Y1), wholesaler (Y2) and retailer (Y3).
The farmer decides to choose the K^{th} market outlet if $Y_{ik}^{*} = U_k^{*} - U_o > 0$. The net benefit ($Y_{ik}^{*}$) that the farmer derives from choosing a market outlet is a latent variable determined by observed explanatory variable (Xi) and the error term (ε_i):

$$Y_{ik}^{*} = \mathrm{X}_i^{'}\beta_k + \varepsilon_i \qquad k = Y_1, Y_2, Y_3$$

Using the indicator function, the unobserved preferences in equation above translates into the observed binary outcome equation for each choice as follows:

$$Y_{ik} = \begin{cases} 1 \; if \;\; Y_{ik}^{*} > 0 \\ 0 \; otherwise \end{cases} \quad (k = Y_1, Y_2, Y_3)$$

In multivariate model, where the choice of several market outlets is possible, the error terms jointly follow a multivariate normal distribution (MVN) with zero conditional mean and variance normalized to unity (for identification of the parameters) where $\mu_{y1}, \mu_{y2}, \mu_{y3}$ $\mathrm{MVN} \sim (0, \Omega)$ and the symmetric covariance matrix is given by:-

$$\Omega = \begin{bmatrix} 1 & \rho_{y_1y_2} & \rho_{y_1y_3} \\ \rho_{y_2y_1} & 1 & \rho_{y_2y_3} \\ \rho_{y_3y_1} & \rho_{y_3y_2} & 1 \end{bmatrix}$$

Of particular interest are off-diagonal elements in the covariance matrix, which represent the unobserved correlation between the stochastic components of the different type of outlets. This assumption means that generates a MVP model that jointly represents decision to choice particular market outlet. This specification with non-zero off-diagonal elements allows for correlation across error terms of several latent equations, which represents unobserved characteristics that affect the choice of alternative outlets.
Following the form used by Cappellarri and Jenkins (2003), the log-likelihood function associated with a sample outcome is then given by;

$$\ln L = \sum_{i=1}^{N} \omega_i \ln \Phi(\mu_i, \Omega)$$

Where is an optional weight for observation i, and Φ_i is the multivariate standard normal distribution with arguments μ_i and Ω, where μ_i can be denoted as;-

$$\mu_i = (k_{i1}\beta_1 \mathrm{X}_{i1}, k_{i2}\beta_2, k_{i3}\beta_3\chi_{i3}), while\ \Omega_{ik} = 1\ for\ j = k \text{ and}$$

$$\Omega_{ik} = \Omega_{ik} = k_{ij}\, k_{ik}\, \rho_{jk}\ for\ j \neq k,\ k = 1,2,3 \ldots with\ k_{ik} = 2y_{ij} - 1$$

RESULTS

Descriptive results

Demographic and socio-economic characteristics of respondents

The mean ages of respondents in Kofele and Kore districts was 37, 29 and 29, respectively, for farmers, traders and consumers (Table 1). Most respondents had attended formal education. The mean family size and landholdings of farmers in the current study areas was 9 persons and 2.5 hectares, respectively. Respondent farmers and traders had been engaged in head cabbage production and trading, respectively, for about 6 and 5 years now. Nearly all respondent farmers in both districts were members of farmers' cooperatives and had access to information related to head cabbage marketing (Table 2). Only one-third of the respondents had access to credit services.

The average family size of the sample households was 8.67 persons, which is larger than the national average of 4.6 persons per household (CSA, 2014b). This implies the need for strengthening family planning programs to strike the balance of population growth with the level of economic development. The average age of the sample respondents was found to be 37.33 years having farming experience of 5.78 years. This implies that most of the household heads were within their productive age bracket. As the study result depicts that, of the entire household heads interviewed, 87.5% were male-headed while the remaining 12.5% were female-headed, who are divorced or widowed at the time of survey. The proportion of household head in the sample is much lower than the national level which is one fourth of the total rural household head is female (CSA, 2014b). The average area covered with head cabbage during the survey cropping season was 0.42 hectares from total farm size of 2.56 hectares. The average distance to travel from home to the nearest market center by farmers in the study area was 1.55km.

Head cabbage production

Of their total land holdings, respondents in the study areas had been allocated 0.42 hectares of land for head cabbage production. Respondent farmers indicated that the mean yield of head cabbage production was 148.31 quintal per hectare. The total average variable cost and revenue were 5097.91 and 9433.78 Birr/ha respectively. Shortage of quality seed, high cost of inputs, poor seed germination, limited knowledge on recommended agronomic practice, diseases and pest attacks, lack of storage and high perishability nature of product are the main production constraints of head cabbage whereas, suitable climatic conditions & fertile land and enabling policy environment & support from public organization & NGOs are the main opportunity for head cabbage production in the study area.

Market supply and marketing of Head cabbage

Head cabbage producer sells different amount of head cabbages depending on different demographic and socioeconomic characteristics of the household. Head cabbage producer farmers were supply on average 50.19 quintals (that is 80%) of head cabbage to market in 2014 production season. Two sample t-test shows that there was significant difference in market supply between the Kofele and Kore districts at 1% significant level (Table 4). The reason was due to the difference in head cabbage production between the districts (Table 3). Price setting problem, product quality problem, broker interferences, low price for the products, high perishability of the product, limited function of cooperative and shortage of transportation are the main market problem of head cabbage product in the study area. Farm gate head cabbage selling was dominated (71.03%) and the rest head cabbage selling was undertaken at village (6.54%), district (17.76%) and out of district (4.67%) respectively. However, due to brokers' interferences, shortage buyers, and low product quality farmers' market incentive obtained from head cabbage sell was very low.

Econometric Results

In this section, the selected explanatory variables were used to understand the determinants of head cabbage producers' market outlet choices decisions.

Based on findings of the multivariate probit (MVP) models, the difference, similarities and significance of the determinants influencing producers' decision in market outlet choice were discussed in this section. The Wald test is significant at the 1% level, which indicates that the subset of coefficients of the model is jointly significant and that the explanatory power of the factors included in the model is satisfactory. Furthermore, results of likelihood ratio test in the model (LR χ^2 (3) = 20.567, $LR\ \chi^2(3) = 8.039,\ p > \chi^2 = 0.0452$ is statistically significant at 5% level, indicating that the independence of the disturbance terms (independence of market outlets choice) is rejected. The likelihood ratio test of the null hypothesis of independence between the market outlets decision ($\rho_{21} = \rho_{31} = \rho_{32} = 0$) is significant at 5%. Therefore, the null hypothesis that all the ρ (Rho) values are jointly equal to 0 is rejected, indicating the goodness-of-fit of the model. Hence, there are differences in market outlet selection behavior among farmers, which are reflected in the likelihood ratio statistics.

Separately considered, the ρ values (ρ_{ij}) indicate the degree of correlation between each pair of dependent variables. The ρ_{32} (correlation between the choice for retailer and wholesaler outlet) are negatively interdependent and significant at the 1% probability level indicating a competitive relationship of retailer outlet with wholesaler outlet. This shows that in head cabbage marketing producers used retailer outlets as substitute for wholesaler outlets. The simulation results also indicate that the probability that milk producers choose collector, wholesaler and retailer outlet were 38%, 90% and 18%, respectively. The joint probabilities of success or failure of choosing the three market outlets suggest that households were unlikely to succeed to jointly choose the three market outlets. The likelihood of households' success to jointly choose the three market outlets were 4.28% compared to their failure to jointly choose the three market outlets of them were 3.38%. As depicted in Table 1 below out of 13 explanatory variables included in multivariate probit model, five variables significantly affected collector market outlet; three variables significantly affected wholesaler and retailer outlet each variables significantly affected restaurant market outlet choices at 1, 5 and 10 percent probability levels. Woreda dummy was positively and significantly related

with collector outlet at 1% significance level. As the Woreda becomes Kofele, the probability of choosing retail outlet increased by 42%. These shows the interference of intermediate traders was low in Kofele Woreda compared to Kore Woreda. The reason may be is the most dominantly produced vegetable in Kofele Woreda is head cabbage and traders are not participated in head cabbage market compared to other vegetables. This forced head cabbage producers to sell to retailers in the market.

The finding reveals that, quantity of head cabbage supply to market was positively and negatively influenced the likelihood of choosing wholesaler and rural collector and retailers market outlet at 1%, 1%, 1% significance level, respectively. This implies that the larger head cabbage quantity sold the more a farmer was likely to sell to wholesaler and less likely to sell to rural collector and retailer outlet. The positive coefficient further implies that households tend to increase association with wholesaler when the amount they sold increase because wholesaler has capacity to purchase large volume of head cabbage. This may be because farmers producing small quantities have little opportunity to sell through wholesaler outlet and more likely to sell to rural collector and retailer outlet. This is a line with Bezabih *et al*. (2015) reported that the likelihood of choosing collector and retailer only market outlet was negatively and significantly affected by potato quantity sold.

Family size is positively and significantly associated with selling head cabbage to collectors at 1% significance level. This result shows that those households with large family size are more likely to choose collectors outlet than other market outlets. This may imply large household size is an indicator of labour availability which enables farmers to produce more head cabbage and sell to collectors' outlets.

Education level of households has negative and significant effect at less than 5% probability level on choosing of collector outlet. The more educated a farmer is the less likely to sell head cabbage through collector because more educated farmers are less time spend on doing marketing activities. The negative relationship between education level and selling to collector outlet can be explained by the fact that being educated enhances the capability of farmers in making informed decisions with regard to the choice of marketing outlets to sell their farm produce based on the marketing margin and marketing cost. A study by Nyaupane and Gillespie (2010) on factors influencing producers‟ marketing decisions in the Louisiana Crawfish Industry found that farmers with college degrees are more likely to sell their product via wholesalers and less likely to market via processors.

The result shows that, distance from nearest market is negatively associated with likelihood of farmers selling to collector at 10% level of significance. It reflects the difficulty of remote households in delivering head cabbage to collector due to lack of market information and poor road facility to sell their product in collector market outlet and sold to available outlet in local market. The finding of Chalwe (2011) showed that distance to nearest market was significantly and negatively related to best channel choice decision. The author reason out that most beans farmers are poor in resource endowment and lack transport resources, transportation costs associated with moving the produce to the market therefore discourage farmers to participate in markets far from their premises.

The likelihood of choosing wholesaler and retailer outlet were positively and negatively affected by farming experience at 10% levels of significance for each market outlet. This result indicated that more experienced households in head cabbage production were more likely to deliver head cabbage to wholesaler outlet and less likely to sell to retailer outlet. The many years engaged in head cabbage production and marketing gives the farmers desire to adjust their market links; trying alternative marketing outlets to increase sales volume or better prices all this to maximize profits. The relationship also implies that experienced farmers had better knowledge of cost and benefits associated with various head cabbage marketing outlets; consequently they are likely to increase the quantities supplied through the wholesalers to benefit from economies of scale. Riziki *et al*. (2015) found that households with more experience in agro-pastoralism are assumed to be more exposed and venture into commercial activities like African indigenous vegetables marketing because they aware marketing and differences in profitability in the different marketing outlets.

CONCLUSION

This study was aimed at analyzing market outlet choice of head cabbage in Kofele and Kore districts of Oromia region. The specific objectives of the study include identifying factors affecting head cabbage market outlet choice decisions of farm households. The data were generated from both primary and secondary sources. The primary data were collected from individual interview using pre-tested semi-structured questionnaire and checklist. The primary data for this study were collected from 120 randomly selected households from Kofele and Kore districts. The analysis was made using descriptive statistics and econometric model using SPSS and STATA software. All the sampled households were head cabbage producers. Therefore, multinomial probit model (MNP) was applied to analyze factors affecting market outlet choice of farmers for selling head cabbage in the study areas. The findings of this study are summarized as follows.

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Of the 120-interviewed head cabbage producing households, 87.5% were male headed and the rest 12.5% were female headed households. The average ages of the sampled respondents were 37.33 years having 5.78 years of farming experience. The average family size was 8.67.

Head cabbage producers in the study areas supply their produce through different market outlets. Farmers were classified into three categories according to their outlet choice decision: those who have supplied most of their produce to collectors (67.13%); those who have supplied most of their produce to wholesalers (26.56%); and those farmers who have supplied most of their produce to retailers (6.31%). The multinomial probit model was run to identify factors determining farmers' market outlet choice decision. The model results indicated that the probability to choose the collector outlet was significantly affected by woreda dummy, education, family size, quantity produced and distance to the nearest market center. Similarly the probability of choosing both wholesaler and retailer marketing outlet were affected by farm experience, quantity produced and by access to credit. Therefore, these variables require special attention if farmers margin from head cabbage production is to be increased.

RECOMMENDATION

The econometric analyses of multivariate probit findings indicated that farmers have been influenced by different factors to choose appropriate marketing outlets to sell their head cabbage product. The results of this study suggest several ways in which smallholder farmers can actively market their produce. The findings suggest that an adjustment in each one of the significant variables can significantly influence the probability of choice market outlets. Initially, expanding equal accessibility of infrastructures such as road and transportation facilities needs government intervention to promote the effective marketing of head cabbage through all outlets.

The findings point to the need for increasing the quantity of head cabbage sold for choice of appropriate market outlets by improving productivity of head cabbage. Policy makers should focus more on enhancing producers' marketed surplus of head cabbage which could be attained through providing the marketing infrastructure, technical and organizational assistance, and access to markets and support to improve the farmers bargaining power by establishment of farmers' organizations. Moreover, the concerned authority should be able to increase the awareness of households about the importance of formal education to choice appropriate market outlets. Distance from the farm to the nearest market significantly affect market outlets choice decision, government should ensure developing markets for head cabbage within reach this will motivate a lot of farmers to participate in head cabbage supply their by increase their income and choice of appropriate outlets.

Firstly, collector outlet choice is negatively and significantly affected by Education, quantity produced and distances from the nearest market center. Therefore, these factors must be promoted by upgrading the knowledge of the households through education and trainings, increase quantity of head cabbage produced and developing road infrastructures. Secondly, farm experience and quantity of head cabbage produced significantly and positively affected wholesaler outlet choice. Therefore improving farmers' farm experience through arranging experience sharing from older farmers is essential to make head cabbage market efficient in addition to increasing quantity of head cabbage produced. Lastly, retailer outlet choice is significantly and positively affected by access to credit service. Therefore, improving farmer's access to credit service is essential to make head cabbage market efficient. Retail outlet choice also negatively and significantly affected by farm experience of the household head and quantity of head cabbage produced. Therefore, these factors must be considered in future intervention.

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