RESEARCH PAPER

Determinants of Onion and Cabbage Market Outlets Choices of Smallholder Farmers: The Case of Holeta town, Oromia Regional State

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Abstract

Market participation and outlet choices in smallholder farmers hold considerable potential revealing suitable opportunity preparations necessary for providing better incomes and worthwhile livelihoods for the study area. Hence this study was intended to analyze determinants of market outlet choice in Holeta district, Oromia National Regional State. To achieve the objectives, 147 vegetable producers were selected following simple random sampling techniques. The collected data were analyzed using a multivariate probit model. The model results show that the probability of choosing wholesalers, middlemen, retailers, and consumers' market outlets was significantly affected by education level, farm experience, land size, family size, distance to near market, input utilization and credit access. Therefore, it is recommended that the government and community should improve rural infrastructure, and smallholder farm productivity through improved inputs (such as vegetable seed, chemicals and fertilizers), encouraging education, promoting farmers' cooperatives, strengthening market information delivery systems, upgrading roads in both rural and peri-urban areas, encourage market integration initiatives, and establish accessible market outlets with improved facilities in the remote rural villages to promote production and market outlets choice in smallholder vegetable farmers.

Keywords: Market outlet, market participation, multivariate probit model, vegetable

Introduction

Ethiopia's agricultural sector is still the backbone of the country, but its development depends on the pace of agricultural growth and the transformation of the current subsistence-oriented production system into market-oriented production (Diriba, 2020; Plecher, 2020). Vegetables are an important source of nutrition in Ethiopia and are primarily produced by horticulture (Tadele and Derbew, 2015). They are integrated into mixed farming systems and are an important commercial activity in Ethiopia. It is also an efficient way to address poverty reduction, take care of consumers, and offer new market opportunities (Rahiel et al., 2018; Bezabih *et al*., 2015; Chala and Chalchisa, 2017).

The government has also developed the second Growth and Transformation Plan for the period 2016–2020 to become a middle-income country by 2025 by improving agricultural productivity and commercialization. Among the strategies, market-oriented agricultural production policies are the central one (Mekonnen, 2015) and the government tries to promote the production and marketing of high-value agricultural products including vegetables to increase the competitiveness of farmers in national and

international markets (Tufa *et al.*, 2013). Cabbage is the second most important vegetable crop, followed by red pepper in the study area (MoA, 2011).

Ethiopian vegetable output markets are characterized by inadequate transport networks, inadequate market information systems and underdeveloped industrial sectors. Smallholder vegetable producers have little information about the market demand, price and times to sell their products (Ibrahim et al, 2012). Vegetable production is a source of income and home consumption for a large proportion of rural households. However, the perishable nature of the product, price fluctuation due to the seasonality of the product and intermediary malpractices, lack of market linkage, price volatility, unidentified market behavior and character altogether impede the potential gains that could have been attained from the existing opportunities. In this case, smallholders' decisions to choose an appropriate market outlet are important farm-household-specific decisions. However, smallholders' decisions about selling their produce in alternative market outlets are made by evaluating the returns in expected utility for each market outlet. By the way, when farmers choose among alternative market outlets, there may be self-selection, as farmers choose their marketing outlets based on their perceptions of the returns they will get from each market outlet (Burhan *et al.*, 2022).

Nahusenay *et al.* (2018) stated that the total land holding of the household, family size, the volume of vegetables produced and marketed, usage of irrigation technologies, interaction with extension agents, and access to market information and vegetable marketing significantly improve the livelihoods of smallholder producers. Similarly, other studies (Hagos *et al.*, 2020; Hao *et al.*, 2018; Megerssa et al., 2020; Ola & Menapace, 2020) were conducted on the different factors affecting the marketing/commercialization of agricultural products by using different methods of data analysis.

Previous empirical studies such as Amare (2017), Demelash (2018), Ephrem (2016) and

Shewaye (2016) attested that the driving factors that lead to the inefficiency of the Vegetable market include limited or lack of improved seed access, price volatility, high taxes and various fees at different levels, overvalued exchange rate, poor coordination skill amongst traders, lack of product quality standard, unfair trade practices imposed by brokers at the market place, lack of market information to producers, long market chain, and few market channel choices, limited grading and quality control systems, and asymmetry of price information that result in a low market participation of producer and a low share of the price for producers (excessive margins from traders over producers).

Different studies such as: Abebe *et al.* (2018), Kassa *et al.* (2017), and Shewaye (2016) identified the factors affecting market outlet choice in different parts of Ethiopia. They found that farmer's decision to choose various market outlets is affected by demographic, socio-economic, institutional, farmer and marketing characteristics. Even if the efforts made by the government to transform smallholder farmers from subsistence to commercial farming system were done, the performance has been considered below expectations (NPC (National Planning Commission, 2016). On top of this, smallholder farmers are unable to benefit from such empirical findings due to unimproved varieties, high transaction costs, lack of infrastructure and inadequate extension services. Thus, improving smallholder farmers' marketing infrastructure is a decisive and important pathway to ensure household income and economic growth of the country (Abafita *et al.*, 2015).

In spite of the fact that vegetable production is crucial for rural economic growth and poverty reduction, limited attention has been given to the sector. Correspondingly, MoFED (2015) argued that so far public research on vegetable crops were negligible and major public policies and attention of extension agents were mainly focused on staple crop production.

Therefore, such types of studies are relevant and help resolve the underlying product-

specific marketing inflexibilities and thereby not only enhancing the livelihoods of farmers but also assisting the governments in their effective planning and specific intervention in the area, offers a better insight to enrich the stock of knowledge limited in the literature regarding smallholder farmer's market outlet choices in vegetable marketing and can also serve as an input for policymakers and

Holeta town is one of the towns of Oromia National Regional State. In the north, south, and east the town is surrounded by Welmera district and in west by Ejere district. Astronomically the town is located between the latitude of 90 01′ 08″N - 90 06′ 15″N and longitude of 380 26′ 40″E -380 32′46″E.

researchers who wish to work in this area. Hence, this study is aimed to full fill these noticeable gaps and investigate market outlet choices of smallholder farmers in Holeta town Oromia regional state.

Materials and methods

Description of the Study Area

During early 2004, several cities were separated from the district administration and bounders from their neighboring woreda and Holeta city is not an exception. Therefore, Holeta town separated from Welmara woreda with distinct boundaries and administration.
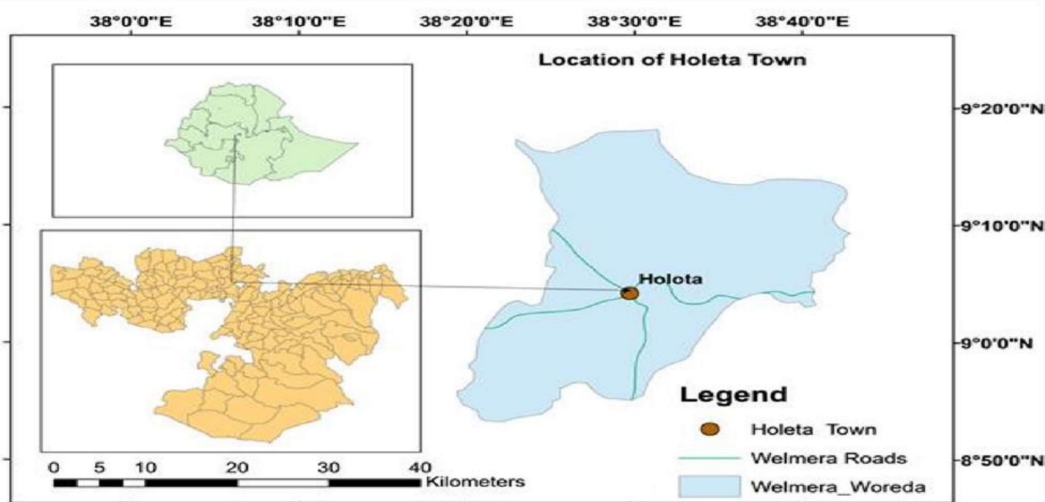

Figure 2: Map of the study area

The altitude ranges between 2250-2500m above sea level. The town is 30 km away from Addis Ababa to the west. The town has eight kebeles with the total area coverage of 5,550 ha (55.5km2) out of which five kebeles are rural

kebeles. The town was founded for the purpose of the military services in the 1900s and it had the status of a Municipality in 1948 (Welmera Woreda Agricultural Bureau 2014).

Sampling Methods and Size Determination

The population of this study is vegetable smallholder producers found in the Holeta districts, Oromia National Regional State, Ethiopia. There is a total of 8 kebeles in Holeta town administration of which five kebeles are producers of vegetables. The populations of this study were smallholders' producers of

vegetables found in the Holeta district, Oromia regional state, Ethiopia

Multi-stage sampling methods were used to select vegetable-producing districts and sample farm households. In the first stage, 8 kebeles in the district were stratified in terms of vegetables producing and non-producing kebeles of which five of them were selected as vegetable producers. In the second stage, two

kebeles were selected randomly from five potential vegetable-producing kebeles. Finally, from the randomly selected two kebeles, 147

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

Where, n = sample size, N= population size (sampling frame) and e = level of precision considered 8%.

sample households were selected randomly based on proportional to the population size by using Yamane's (1967) formula.

$$n = \frac{2483}{1+2483(0.08^2)} = 147 \dots\dots\dots 2$$

Table 1. Sample kebeles by their respective household heads

S.N	Sample kebeles	Vegetable producers	Sample size
1	Birbirsa siba	994	50
2	Medagudina	1489	97
	Total	2,483	147

Source; own survey result

Data Type, Sources and Methods of Collection

Both primary and secondary data were used for this study. Primary data were collected from randomly selected smallholder vegetable-producing farmers in Holeta town using a pre-tested semi-structured questionnaire. The primary data constitute information related to the factors affecting market participation and outlet choice. In addition, Focus Group Discussion (FGD) and Key Informant Interviews were also collected to supplement the primary data. Secondary data were also collected from Holeta town Agriculture office and Central Statistical Authority (CSA).

Methods of Data Analysis

Descriptive statistical analysis such as frequency, percentage and standard deviations were used to explain the marketing characteristics and vegetable marketing channels.

The producer's decision to participate in a given market is derived from the maximization of expected utility from these markets and helps to reduce some risks than a single market

channel (Arinloye *et al*., 2015). Econometric models such as multivariate probit/logit and multinomial probit/logit are useful models for the analysis of categorical choice-dependent variables. Multinomial models are appropriate when individuals can choose only one outcome from among the set of mutually exclusive and collectively exhaustive alternatives. However, in the study area, there are several market outlets (Primary cooperatives, wholesalers, Assemblers, Retailers and consumers) and farmers have the possibility to select more outlets simultaneously to maximize the expected utility due to this there are some overlapping and many farmers sell to more than one market outlet. In view of this, most previous similar research applied multivariate probit (MVP) to analyze the determinants of market outlets choices in a different part of Ethiopia (Shewaye *et al*., 2016; Kassa *et al*., 2017; Abebe *et al*., 2018; Tadie *et al*., 2019). Similarly, this study applied the MVP model to analyze the simultaneous influence of the explanatory variables on market outlet choices, while allowing the unobserved and/or unmeasured factors (error terms) to be freely correlated as well as the relationships between the choices of different market outlets (Greene, 2012).

The observed outcome of market outcome choice can be modeled following random utility formulation. Consider the ith farm household (i=1, 2, 3...N), facing a decision problem on whether or not to choose the available market. Let Uk represent the benefits of farmers choosing the mth market outlet where m denotes the choice of the whole seller (Y1), middlemen (Y2), Retailer (Y3) and consumer (Y4). The producer decides to choose the mth market outlet if, $Y^* = Uk^* - U0 > 0$. The net benefit (Y_{im*}) that the farmer derives from choosing a market outlet is a latent variable determined by the observed explanatory variable (Xi) and the error term (εi):

$$Y_{im*} = \beta_{im}X_{im} + \varepsilon_{im} \quad Y_{im} = \{1, \; if y > 0, 0$$
$$Oterwise..3$$

Where Y_{im} (m=1, 2,.....4) denotes the market outlet choices, (Y_1) for wholesales, (Y_2) for middlemen, (Y_3) for retailers, (Y_4) for consumer, available for i^{th} vegetable producer, (i = 1.....n); X_{im} *is a* vector of explanatory variables, β_{im} denotes the vector of parameters to be estimated, and ε_{im} are random error terms jointly follow a multivariate normal distribution with zero conditional mean.

Results and Discussion

Descriptive Statistics Results

In order to understand and compare respondents' group differences between non-participants and participants in the smallholder vegetable markets, descriptive statistics such as percentage and standard deviation. The survey result indicated that out of 147 sampled households, 105 were vegetable market participants whereas the remaining 42 households were nonparticipants. Vegetable producers sell different amounts of vegetables in the market depending on different demographic and socioeconomic characteristics of the household. On average, vegetable producers sold 18,857.14 kilograms of vegetables (onion and cabbage) in the 2021 production season.

Table 2; displays the different responses of smallholder vegetable farmers market Channels/outlets choices when selling their produce to vegetable markets. One of the most used market outlets by producers is the wholesale outlet which was chosen by about 66(62.86%) of respondents, while about 44(41.9%) of respondents sold to the retailer. As Table 2 result depicted, 35(33.33%) of the producers had also chosen middlemen outlets whereas 27(25.71%) of the sample households sold directly to the consumer's outlets.

Table 2. Description of smallholder farmers' vegetable market outlets

Supply Decision	Vegetable market outlets							
	Wholesale		Middlemen		Retailer		Consumer	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Yes	66	62.86	35	33.33	44	41.9	27	25.71
No	39	37.14	70	66.67	61	58.1	78	74.29

Source: own survey data, 2021/22

Multivariate probit model results

In the model result Wald chi2(52) = 135.47 was significant at a 1% significance 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; thus, the MVP model fits the data reasonably well. Likewise, the model is significant because the null that the choice decision of the four vegetable market outlets is independent was rejected at a 1% significance

level. The results of the likelihood ratio test in the model indicate the null that the independence between market outlet choice decision (rho21 = rho31 = rho41 = rho32 = rho42 = rho43 = 0) is rejected at 1% significance level and there are significant joint correlations for four estimated coefficients across the equations in the models.

There are differences in market outlet selection behavior among producers, which are reflected in the likelihood ratio statistics of the estimated correlation matrix shows that the correlation between each pair of dependent variables rho41 (correlation between the choice for consumer and wholesaler outlet) and rho32 (correlation between the choice for retailer and middlemen outlet) are negative interdependent and significant at the 1% probability levels. This finding leads us to the conclusion that smallholder vegetable producers delivering to consumer outlets are less likely to distribute to wholesalers and also those involved in retail market outlets are less likely to deliver their vegetables to the middlemen outlets.

The multivariate probit model was employed in determining the factors that affected the choice of market outlets among smallholder vegetable producers. The study found four outlets for the smallholder vegetable produce, which are wholesalers, middlemen, retailers and consumers. The producers thus sold their vegetables among these outlets in various proportions. If the inter-relationships involved in selling among the various outlets are not taken into consideration, it may result in biased estimates of the factors that influence the choice of the produce market outlets. The multivariate probit model was thus used to explain the interdependent relationships of the market outlets. The result in Table 7 shows that out of 13 explanatory variables entered in the multivariate probit model that can affect the market channel choice of vegetables in the district seven variables had a significant effect on market outlet choice. These were educational level, farm experiences, market distance, family size of household, land size, input access, and credit access were found to significantly affect the market outlet choice behavior of vegetable producers.

As the result of Table 3, Land size for vegetables has a positive and significant effect on the likelihood of the probability of wholesaler and middlemen outlet at a 1% significance level while it has a negative and significant effect on the likelihood of choosing consumer outlet at 5%. This implies households with a large area of cultivated vegetables probably produce large volumes and are less likely to sell to consumer outlets who buy in small quantities, instead supplying to wholesalers and middlemen a combination of market outlets rather than delivering only to single market outlets. The result agrees with Ebrahim *et al.* (2020) and Mebrat (2014) who found that farm size positively affected the probability of farmers' choice of wholesaler outlets as farmers with larger total landholding produce large amount and prefer to sell in bulk quantities. This is also in line with Hawlet *et al* (2019) who found that farmers with more landholdings produce large amounts and prefer to sell this large amount to wholesalers rather than consumers.

Input access has a positive and significant effect on the likelihood of choosing wholesaler and consumer outlets at 1% and 5% significant levels (Table 3). This may indicate the more input access to farmers, the more diversity their vegetable production on their limited land and supply to address diverse market outlets including wholesalers and consumers. This indicates that using modern agricultural inputs like chemical fertilizers improves the yield of onion and cabbage so that farmers can decide to supply their large quantity to the wholesale market outlets. Beyene *et al.* (2020) also reported that chemical fertilizer positively and significantly influenced haricot bean production and market participation.

The effect of distance to the nearest market was found to affect positively and significantly wholesaler and middlemen vegetable market outlets at 1% and 5% probability levels, respectively (Table 3). On the contrary, the likelihood of choosing a retailer and consumer market outlet is significantly and negatively influenced by distance to the nearest market at a 1% probability level. This indicated that farmers whose residences are far from the

nearest urban market are more interested in selling their product to wholesalers and middlemen market outlets in bulk quantity rather than selling to retailers and consumer outlets. The implication of choosing wholesale and middlemen market outlets is also because of the perishable characteristics of the product, farmers would prefer to sell large quantities at one time rather than spending more time in consumers' outlets. This result is in line with Melese *et al.* (2018). The result is consistent with Chaimiso et al (2022) discovered retail market outlet of potato marketing was negatively and significantly affected by market distance. This result is also in line with Shewaye *et al.*, (2016), and Arinloye *et al.* (2015).

As the model result of Table 3, Household size has a negative and significant relationship with the likelihood of choosing retailers and consumer outlets at a 1% significant level. As can be understood from the results, the probability of choosing a retailer and consumer channel decreased when the number of families increased. This result is in line with Temesgen *et al.* (2017) who found that as the number of families increased, the probability of participating in vegetable production decreased. Contrary to this Efa and Tura et al. (2018) indicated that large family size enables better labor endowment so that households are in a position to travel to get wholesalers in the district or nearby town markets. Similarly, a study showed that having a large family size was better for delivering output to the better-pricing market outlet (Nigel and Silveira, 2023).

As Table 3 depicts, the educational level of the household head has a negative and significant effect on the market channel choice of a consumer at a 1% significant level. The reason is that education increases the ability of farmers to analyze relevant market information and choose the best market outlet that is expected to give a better price for their produce. Formal education enhances the information acquirement and adjustment abilities of the farmer, thereby improving the quality of decision-making on choosing profitable and productive market outlets. This result is consistent with the findings of Addisu (2017) who found that educated farmers were less likely to sell potato through consumer outlets because educated farmers value their time devoted to marketing activities. It is also in line with Ebrahim *et al.* (2020) who revealed that the education level of household heads negatively affected the likelihood of choosing consumer outlets in vegetable marketing.

Table 3 shows farm experience in vegetable production affects market outlet choice positively and significantly for the likelihood of choosing retail outlets at a 1% significant level. This is because experienced households are expected to have market information and linkage with retailers who buy more quantities at better prices. This is in line with Chaimiso et al (2022) found that the more experienced vegetable farmers who produce a huge amount of products might choose a wholesaler or retailer channel choice to sell a huge amount of products rather than a collector or consumer. It is also supported by Efa and Tura, (2018) discovered that the experience of the producer had a positive effect on choosing better market outlet choices.

As the result of Table 3, Access to credit has a positive and significant effect on households "choice of consumer market outlet at a 5 % significance level. Access to credit would enhance the financial capacity of the farm households to purchase the necessary materials and increase output. The credit further enhanced their capacity to accommodate harvesting, packing and transport costs required in selling to more market outlets including consumers. The finding is similar to Kirimi et al. (2013) who found that access to credit enables mango producers to attain better yields thus being able to sell to high-value markets for better returns. The result is also in line with Hawlet *et al.* (2020) and Melese *et al.* (2018) found that access to credit has a positive and significant effect on choosing a consumer market outlet for marketing onion.

Table 3. Multivariate Probit Result

Market Outlet	Wholesale		Middlemen		Retailer		Consumer	
Variables	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Marital	0.025	0.192	-0.306	0.2337	0.154	0.159	0.111	0.186
Family Size	-0.148	0.115	0.089	0.1230	-0.453**	0.118	-0.375**	0.136
Education Level	0.134	0.134	0.193	0.1176	-0.044	0.103	-0.514**	0.178
Farm Experience	0.018	0.015	0.020	0.0163	0.029**	0.013	-0.021	0.016
Off-farm Income	-0.079	0.170	-0.148	0.1800	-0.135	0.160	0.106	0.182
Land size	1.493**	0.428	0.972**	0.3233	0.447	0.301	-0.564*	0.337
extension Service input	0.120	0.224	0.145	0.2145	-0.014	0.206	0.085	0.227
Access	1.243**	0.526	0.725	0.5641	0.056	0.397	0.970*	0.506
Price	-0.338	0.304	-0.301	0.3343	0.230	0.231	-0.343	0.286
Market Distance	0.362**	0.164	0.291*	0.1682	-0.327**	0.140	-0.494**	0.178
Transport Access	-0.332	0.340	0.379	0.3523	0.070	0.289	-0.152	0.322
Market info Access	-0.039	0.353	-0.440	0.3208	-0.406	0.311	-0.298	0.356
Credit Access	-0.274	0.319	-0.512	0.3312	0.133	0.280	0.567**	0.337
Cons	-3.234	1.848	-3.440	1.8968	1.590	1.499	4.748	1.980

Likelihood ratio test of rho21 = rho31 = rho41 = rho32 = rho42 = rho43 = 0: chi2 (6)21.4213 Prob > chi2 = 0.0015

Source: Own survey data, 2021; ***significant at 1%, **significant at 5%, *significant at 10%

Conclusion

Ethiopia's population experiences malnutrition due to heavy dependency on cereal crops. Vegetable crops are a very important source of nutrition in a country like Ethiopia. The rate of agricultural growth depends upon the pace with which the current subsistence-based production system is transformed into market-oriented production. The study was carried out in Holeta district, Oromia regional state. The amount of vegetables supplied to the market was significantly influenced by the family size, land size, farm experience, input access and inverse Mill's ratio (LAMBDA). The multivariate probit model was run to identify factors determining farmers' market outlet choice decisions. The model result indicated that the probability of choosing wholesalers' marketing outlets for vegetables was significantly affected by land size, input access, and market distance. Similarly, the probability of choosing a middleman marketing outlet was affected by land size and distance to the market. The probability of choosing retailers' market outlets was significantly affected by family size, distance to nearby markets and farm experience. The probability of choosing consumers' market outlet was significantly affected by educational level, family size, land

size, input access, market distance and credit access.

Price factors should play a great role in market participation as well as the choice of marketing outlet. This implies that farmers with price information are more likely to participate in vegetable marketing and are in the right position to make careful decisions on an appropriate market outlet. Therefore, the farmer should always have access to price information. Awareness creation on sources of market information, in what way to select appropriate market outlets should be prearranged by the government agriculture offices and market experts in the study area. Therefore, the Provision of technical advice to the farmers on cabbage and onion production and marketing, enhances the participation decision, volume of participation and choice of efficient market channel.

On the other side, agriculture offices, research institutes, universities; and different nonprofit institutions should provide training to increase the dissemination of new and modern production processes, tools, and technologies as well as improved practices and vegetable seeds for farmers. Finally, further research is needed on determinants of vegetable farmers' production schedule to know their best marketing season to get optimum prices.

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