

Market Outlet Choices among Smallholder Edible Oilseed Producers in Hararghe, Ethiopia

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Abstract

This study employed cross-sectional survey to examine determinants of market outlet choices among 383 edible oilseeds producing smallholder in Hararghe, Ethiopia. The study utilized multivariate probit model. The results indicates significant interrelated and interdependent markets outlets. Access to market information's and extension services shifts significantly smallholder from informal market outlets to formal market outlets. The larger volumes, male-headed household and access to credit significantly increase the probability to sell to wholesales, while farmers at distance from the main markets outlets heavily rely on cooperative market outlets to reduce transactions costs. Smallholder producing groundnuts highly commercialized across wholesales, retailers, and cooperative market outlets than soybean producers. It is vital to focus on the orientation of the extension services to market outlets choices in addition to assisting smallholder farmers to improve agricultural productivity. Establish digitalized platforms to reduce market information asymmetry. It is also quite essential to provide access to agricultural credit to improve smallholder capacity to invest in agricultural technologies to increase surplus produces for the market. To accelerate smallholder integration into high-value market chains, interventions policies must prioritize strengthening targeted extension, market information systems, and credit access.

Keywords: *Oilseeds, Market outlet, Multivariate probit, Smallholder, Ethiopia*

Introductions

Agriculture is the dominant source of livelihoods and a backbone of the economy for developing nations. It serves as source of raw materials for agro-industry, income, and job opportunities (Woldemichael *et al* 2017; Matthew *et al.*, 2019). About 3 billion people residing in rural areas of low and middle-income countries and one in three workers worldwide engaged in the agriculture sector (Davis *et al.*, 2023). In Sub-Saharan Africa, it is a vital sector as a means of livelihoods for millions (Sakho-Jimbira and Hathie, 2020). For example, in countries like Kenya, Uganda, and Tanzania, over 80% of their populations rely on agriculture (Kissoly *et al.*, 2017). The sector also makes significant contributions to wealth generation (Osabohien *et al.*, 2019). Thus, agricultural development in Africa is considered as the flagship strategy and remains to be a leading sector in the economies of the countries (Chevallier, 2023). Similarly, in Ethiopia agriculture is a dominant sector in national economy. It contributes 32.7% to the GDP and 65% to the employment opportunity (NBE, 2024). The sector also contributes about 77% to export earnings and about 70% of country's raw materials for manufacturing industries (NBE, 2022).

In Ethiopia, crop production takes the largest share of the agricultural sector's outputs and land area coverage, contributing over 65% of the agricultural GDP (CSA, 2021). Among crop productions, oilseed sector plays an important role in generating 20% foreign exchange earnings and supporting the livelihoods of market actors across the value chain (Terefe and Girma, 2022). It also accounts for 8% and 4% of total cultivated grain land area, and total national crop production volume respectively (CSA, 2021), and supports livelihoods of more than four million smallholder farmers (CSA, 2021). It is one of the strategic commodities (Sirany *et al*, 2022; Terefe and Girma, 2022; Woldeyohannes *et al.*, 2023). Over the past six decades, 156 improved varieties of edible oilseeds (covering crops like *Guizotia abyssinica*, *Brassica carinata*, linseed, soybean, sunflower, castor, sesame, groundnut, and cotton) along with

their production technologies have been released (Alemaw and Gurmu, 2023). Despite government's significant effort huge to improve production and productivity of oils seeds to ensure self-sufficiency in local edible oil production, the country still imports 90% of the total edible oil demand (Alemaw and Gurmu, 2023). As a result, the country spends over 600 million US Dollars annually and making the country vulnerable to global supply and price fluctuations (NBE, 2024).

To overcome market prices fluctuation and coping-up with the country's chronic edible oil deficit, the government needs to address the imbalance between the demand and supply gaps. Resolving this gap requires overcoming deep-rooted smallholder farmer's challenges of production and access to market (Abate and Alemaw, 2024). Increasing access to certified seeds, providing access to modern agricultural tools and extensions services, and creating market linkage along the value chains are critical to address these challenges (Woolfrey et al., 2021). Furthermore, integrating fragmented smallholders' farmers into structured and efficient market outlets to ensure a consistent product flows, while maximizing returns for rural farmers (Legesse et al. 2024). However, smallholder farmers in country are receiving minimal share from the final prices paid by consumers due to weak value chain integration, excessive intermediaries, poor value chain and actors' coordination (Ozkan et al., 2022; Sori and Adugna, 2022), which is also common for Hararghe zones. Understanding how smallholder farmers integrated into high market value chain is a critical concern for this study. Therefore, this study seeks to empirically analyze market outlet choice decisions of smallholder farmers and identifying the key determinants influencing their integration into the edible oilseed value chains focusing groundnut and soybean in the east and west Hararghe administrative zones of Ethiopia.

Materials and Methods

Study Area

The study area covers East and West Hararghe administrative zones of Oromia National Regional State, Ethiopia. Geographically, west and east Hararghe zones are 200km and 400km away from the capital city of the country Addis Ababa respectively (**Figure 1**). The administrative zones encompass varied topography ranging from 1,000 up to 3,405 meters, peaking at Gara Muleta Mountain. Lowland covering 30 - 40%, midland accounting for 35 - 45%, and highland comprising 15 - 20% of the study area (CSA, 2021). The average household size of the study area is around 6 to 7 members.

Agriculture serve as backbone of economic activities and the primary sources source of smallholders livelihoods. Beyond direct farming, agriculture acts as the primary engine for the entire non-farm rural economy in Hararghe. It generates employment across the value chain, including agricultural labor, local commodity aggregation, small-scale transport and small trucks moving produce to main markets outlets, primary processing, and rural market trading. Maize, sorghum, sweet potatoes, barley, wheat and pulses are key staple crops while Khat, potatoes, onions, shallots, are common cash crops cultivated in the area. While edible oilseeds are a crucial cash crop that significantly contributes to household incomes (Hailu, and Wako, 2024). Livestock farming is equally an important source of livelihoods. Despite the existence of these potentials, smallholder farmers in the study area encounter persistent challenges like erratic rainfall and limited market access challenges. The study was conducted in the Hararghe

administrative zones located in the eastern part of Ethiopia. Geographically, West Hararghe is situated around central coordinates of 8°40' N and 40°51' E, while East Hararghe extends between latitudes 7°36' N to 9°41' N and longitudes 41°18' E to 43°00' E. Geographic Coordinate Extent: The main map grid places the study region approximately between 7°0' 0"N to 10°0' 0' N latitude and 40°0'0' E to 43°0'0' E longitude.

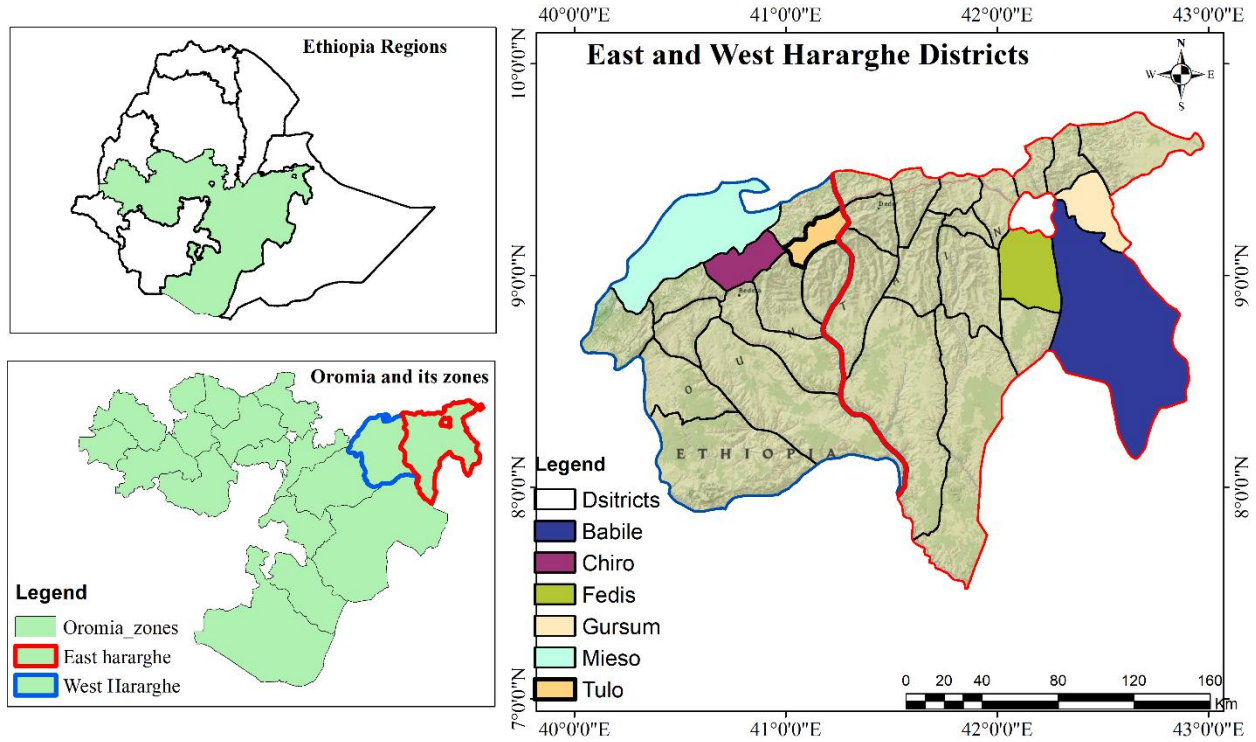


Fig. 1. Map of the study area

Sampling Procedure and Sample Size Determination

The study utilized a four stage-sampling framework. First, the East and West Hararghe zones were purposively targeted based on their regional prominence in oilseed production. Second, six target districts specifically Babile, Fedis, and Gursum from East Hararghe, alongside Chiro, Tulo, and Mieso from West Hararghe were selected to capture representative production areas. Third, a simple random draw was executed within each district to select three major groundnut and soybean-producing kebeles, yielding a total of 18 sample kebeles. Finally, from the available list of households at each kebele, 383 sample households were randomly selected using probability proportional to sample size (PPS) ensuring a representative sample and minimizing selection bias. The sample size was determined using the Krejcie and Morgan (1970) table and its corresponding formula from the total target population of 123,230.

$$n = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2(P(1-P))} \quad (1)$$

$$n = \frac{3.841 \times 123,230 \times 0.50(1 - 0.50)}{(0.05)^2 \times (123,230 - 1) \times 3.841 \times 0.5(1 - 0.50)} = 383$$

Where, n = required sample size, X^2 = the table value of chi-square for one degree of freedom at the confidence level of 95%, N = the population size of the study, p = the population proportion (assumed to be .50), d = the degree of accuracy expressed as a proportion (.05).

Data Collection

The primary data were gathered through cross-sectional survey utilizing structured survey questionnaire filled by sampled smallholder producing edible oilseeds in east and west Hararghe administrative zones, Ethiopia, from January to March 2026. Prior to the main data collection, questionnaire was rigorously reviewed to ensure its content validity. In addition, pre-tested with 15 households to assess its clarity, relevance, and appropriateness. The feedback obtained from this pilot test was used to revise the survey questionnaire to improve reliability and overall quality. Comprehensive training on the objectives of the study, contents and administration of the questionnaire, techniques for engaging respondents, and ethical considerations were provided to the enumerators to ensure collection of quality data. The researcher oversampled smallholder through distributing more than 403 households, exceeding the minimum required sample size of 383. This approach was adopted to mitigate the risk of non-response or incomplete survey and to ensure the reliability and validity of the final 383 utilized responses. Collected data encompassed demographic, socioeconomic, institutional, marketing, and farm-level characteristics of smallholder farmers. Secondary data were also obtained from various sources including annual reports of district agricultural offices, input suppliers, and trade offices to support and enrich the analysis.

Hypothesis and Variables

Table 1 shows the definition, measurement, and expected signs of explanatory variables across market outlets. Market Outlet Choices is a dependent variable and it is measured by the probability of selling edible oilseeds to either of the market outlets. The market outlet choices might be along farmer's decision involving more than two markets outlets choices.

Table 1: Definition, measurement, and expected signs of explanatory variables across market outlets

Variable Name	Type and Operational Measurement	Collector	Retailer	Wholesaler	Cooperatives
Gender	Dummy: 1 if the household head is Male; 0 if Female	+ / -	+ / -	+	+
Education level	Dummy: 1 if head attained primary Education; 0 otherwise	-	-	+	+
Distance from Main market	Continuous: Distance to the main market center (in km)	+	+	-	-
Access to extension service	Dummy: 1 if household has Access to Extension Services; 0 otherwise	-	-	+	+
Cooperative member	Dummy: 1 if household is a member of Cooperative; 0 otherwise	-	-	-	+
Quantity sold	Continuous: Quantity of production sold in the market (kg)	-	-	+	+
Access to Market information	Dummy: 1 if household has Access to Market Information; 0 Otherwise	-	+	+	+
Access to credit	Dummy: 1 if household has Access to Credit; 0 otherwise	-	-	+	+
Oilseeds production Experience	Continuous: Oilseed production experience of the head (in years)	+	+	+ / -	+ / -
Edible Oilseed Type	Dummy variable: 1 if the household produced groundnut; 0 soybean	+/-	+/-	+	+

Source: constructed from literature review, ‘+’ indicates a hypothesized positive relationship (increases probability of choice); ‘-’ indicates a hypothesized negative relationship (decreases probability of choice); ‘+ / -’ denotes an ambiguous effect depending on market dynamics.

Data Analysis

Before conducting data analysis, a rigorous data-validation protocol was implemented to ensure the integrity of the primary data set. Raw survey instruments were systematically scrutinized for internal consistency and completeness. To minimize measurement error, the data underwent a comprehensive process of editing, coding, and multi-stage cleaning. The subsequent analysis employed a dual-methodological approach: descriptive statistics (means, standard deviations, and frequency distributions) were used to characterize the socioeconomic profile of the sampled households, while advanced econometric modeling was applied to isolate the determinants of market outlet choices. All computational procedures were executed using Stata (version 18).

Descriptive Statistics

Descriptive statistical techniques were employed to summarize and present the key characteristics of respondents. Specifically, measures such as frequencies, percentages, and means were used to analyze and describe quantitative data related to the socio-demographic, economic, and institutional attributes of respondents. These statistics provide a clear and concise overview of the distribution and patterns within the data, thereby facilitating a better understanding of the study population and serving as a foundation for further econometric analysis.

Econometric Analysis

Multinomial logit models are one of the econometric models used to analyze categorical choice decisions. Several empirical studies have applied multinomial logit model to examine market outlet choices (Emana *et al.*, 2015a; Adugna *et al.*, 2019; Endris *et al.*, 2020; Ozkan *et al.*, 2022). The assumption of independence of irrelevant alternatives, which restricts its ability to capture correlations among different outlet choices, is a key limitation of the multinomial logit model. Whereas, multivariate probit model allows the error terms across equations to be correlated, thereby providing more realistic and reliable estimates. It also applied to identify factors affecting farmer's market outlet choices (Greene, 2003). This model captures simultaneous influence of explanatory variables on each set of market outlets, potential correlation among unobserved disturbances, and the relationship between the choices of different market outlets (Greene, 2008b). Farmers choose a market outlet that maximizes income from a set of mutually exclusive market outlets (Yaméogo *et al.*, 2018). The farmer's choice expressed using the random discrete choice decisions (Greene, 2008). The MVP framework allows for the joint estimation of multiple binary decisions while accounting for potential correlations among unobserved factors influencing each choice (Belderbos *et al.*, 2004). Each available outlet presents different costs and income, leading farmers to evaluate and choose of outlets that yield the highest overall utility. Smallholder made a rational choice to maximize their benefit (Hess *et al.*, 2018). Therefore, the study adopts the MVP model to provide a more comprehensive and robust analysis of market outlet choices. Thus, random utility framework, (farmer $i = 1 \dots N$, farmers choose among four market outlets (collectors, wholesalers, retailers and cooperatives) and each alternative $j \in \{1, 2, 3, 4\}$ respectively.

$$\text{Farmers market outlet choice: } U_{ij} = X_i' \beta_j + \varepsilon_{ij} \quad (2)$$

Where:

X_i = vector of household/farm characteristics
 β_j = outlet-specific parameters
 ε_{ij} = random error term

$$\text{Farmer } i \text{ chooses outlet } j \text{ if: } U_{ij} > U_{ik} \quad \forall k \neq j \quad (3)$$

Where:

U_{ik} = Utility that farmer i gets from choosing alternative k (any other outlet)
 $\forall k \neq j$ = for all k not equal to j (i.e., all other outlets except the chosen one)

$$Y_{ij} = \begin{cases} 1 & \text{if outlet } j \text{ is chosen} \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

The model can be clearly specified as follows:

$$Y_{i1} = \beta_1 X_{ij} + \varepsilon_{i1} \quad (5)$$

$$Y_{i2} = \beta_2 X_{ij} + \varepsilon_{i2}, \quad (6)$$

$$Y_{i3} = \beta_3 X_{ij} + \varepsilon_{i3} \quad (7)$$

$$Y_{i4} = \beta_4 X_{ij} + \varepsilon_{i4} \quad (8)$$

Where:

$Y_{i1} = 1$, if farmer choose collectors market outlet, 0 otherwise; $Y_{i2} = 1$, if farmer choose retailer market outlet, 0 otherwise; $Y_{i3} = 1$, if farmer choose wholesaler, 0 otherwise; $Y_{i4} = 1$, if farmer choose cooperatives, 0 otherwise; X_i = vector of factors affecting market outlet choice, β_j = vector of unknown parameters ($j=1, 2, 3, 4$), and ε = is the error term. The error terms ($\varepsilon_1, \varepsilon_2, \varepsilon_3$ and ε_4) are assumed to be correlated. These four error terms follow a multivariate normal distribution with zero mean and variance and covariance matrix. In multivariate model, several market outlets choice is possible. The error terms jointly follow a multivariate normal distribution (MVN) with zero conditional mean and variance normalized to unity. Where the vector of error terms $\varepsilon_i = (\varepsilon_{i1}, \varepsilon_{i2}, \varepsilon_{i3}, \varepsilon_{i4})$, follows a multivariate normal distribution: $\varepsilon_i \sim \text{MVN}(0, \Sigma)$, the symmetric covariance matrix Σ is given by:

$$\Sigma = \begin{bmatrix} 1 & \rho_{12} & \rho_{13} & \rho_{14} \\ \rho_{21} & 1 & \rho_{23} & \rho_{24} \\ \rho_{31} & \rho_{32} & 1 & \rho_{34} \\ \rho_{41} & \rho_{42} & \rho_{43} & 1 \end{bmatrix} \quad (9)$$

$\rho_{jk} \neq 0$, are the off-diagonal elements in the covariance matrix, which represent the unobserved correlation between the stochastic components of the different types of outlets. Assuming that the unobserved error terms across the discrete market equations follow a multivariate normal distribution with a mean vector of zero and a symmetric variance-covariance matrix, smallholder farmers' decisions to choose among alternative market outlets are statistically interdependent and must be modeled jointly rather than independently.

Results and Discussions

The socio-economic and demographic characteristics of the households

The analysis was done based on data collected from 383 edible oilseed producing farmers to assess factors influencing retailers, collectors, wholesalers, cooperatives outlet choices. Groundnut producer's household was sampled from Babile, Fedis, and Gursum districts in the East Hararghe Conversely, soybean producers was sampled from smallholders in the Tulo, Chiro, and Mieso districts of the West Hararghe Zone, where this relatively newly introduced edible oilseeds. Household head gender, cooperative membership, access to market information, credit, oilseed farming experience, family size, market distance, land allocation to oilseeds, quantity sold and access to extension services were summarized using descriptive statistics.

Table 2: General characteristics of household head (Dummy Variables)

Variables	Frequency	Percent
Sex of household head	Female	101
	Male	282
Education level	Primary	199
	No-formal	184
Cooperative membership	None	218
	Member	165
Market information	No access	105
	Access	278
Access to credit	No access	286
	Access	97
Edible oilseeds producer	Groundnuts	204
	soybean	179

Source: Survey Result, 2026

Table 2 presents an overview of key demographic, socioeconomic, and institutional characteristics of the 383 smallholder farmers. About 73.63%, the respondents are from male-headed households, while 26.37% are female-headed. This distribution reflects a predominance of male-headed households. Decision-making dynamics and access to resources are mainly male dominant, which is common in most rural settings in the country and reflects the gender imbalance in rural economies (Embiyale,2025). About 51.96%, of the sampled household heads have formal education while 48.04% of the populations have no formal education. Education enhances a farmer's ability to choose the maximum market outlets. Farmers with no primary education are expected to face challenges to understand government extension services and value chain interventions.

More than half of the households (56.92%) are not members of cooperatives, whereas 43.08% are members. Many households in the study area are out of the opportunities being a cooperative member like getting access to inputs, information, and collective marketing. While, 72.58% of the households have access to market information. Access to market information is crucial to make informed decisions and to improve their bargaining power (Jebesa, 2019). On the contrary, about 74.67% of households lack access to credit, with only 25.33% having access to credit. Farmers' ability to invest in inputs, technology, and their high value market participation are significantly affected by rural credit access (Urago and Bozoğlu,2022). Of the 383 surveyed smallholders, groundnuts constitute 204 households (53.3%) from east Hararghe, while 179 households (46.7%) were soybeans producers taken from west Hararghe zone. **Table 2;** show that the predominance of male-headed households, moderate cooperative membership, relatively good access to market information, and limited credit access suggest areas where targeted interventions such as improving credit availability and promoting cooperative membership could enhance farmers' market outcomes.

Table 3. Characteristics (continuous variables) of oilseeds producing farmers

Variable	Obs	Mean	Std. dev.	Min	Max
Oilseeds crops productions experience	383	19.044	10.677	5	44
Family size	383	7.402	1.741	3	12
Distance from the main market (Km)	383	15.005	5.869	3	35
Land allocated to edible oil seeds (ha)	383	.642	.412	.15	2
Quantity produced in kilogram	383	679.707	313.520	150	1780
Quantity sold (kg)	383	571.279	281.474	0	1600
Frequency of extension contact (year)	383	3.156	1.972	0	5

Obs= Observations

Source: Survey result, 2026

The average oilseed crops production experience of the household is approximately 19 years, ranging from 5 to 44 years (**Table 3**). The average family size of the household is seven and more members, varying between 3 and 12. Farm labor availability significantly affect the quantity of oilseed crops produced. Despite the different family planning measures taken by the government to control rapid population growth nationwide. Farmers in the study area allocate 0.64 hectares on average ranging from 0.15 to 2 hectares. Even though the land allocated to edible oilseed crop production has been increasing over the last 15 years, it is still very small in the study area (CSA, 2021). The average distance to the nearby market in the study area is 15 kilometers. On average, a household produced 313.52Kg oilseed crops per annum. The average edible oilseeds crops sold reached 571Kg in the previous farming season. The frequency of agricultural extension services was reported to be moderate, though some households have no contact

with extension workers.

Determinants of Edible Oilseed Crops Market Outlet Choices

The results of the Multivariate Probit (MVP) model estimating the determinants of market outlet choices among edible oilseed-producing farmers are presented in **Table 4**. The results highlight the key socioeconomic, institutional, and market-related factors influencing farmers' selection of alternative market outlets. **Table 5** indicate the correlation matrix of the market outlets (ρ_{jk}). The estimated coefficients and their corresponding significance levels are discussed in detail in subsequent paragraphs.

Table 4: Multivariate Probit Model Estimation Results for Market Outlet Choices

Explanatory Variables	Collector	Wholesaler	Retailer	Cooperative
Gender (Male)	0.0188 (0.1984)	0.3950** (0.1799)	0.0116 (0.1709)	-0.1837 (0.1940)
Education (Primary)	0.061 (0.208)	-0.197 (0.213)	0.015 (0.199)	0.172 (0.204)
Family Size	0.040 (0.050)	0.014 (0.048)	0.036 (0.044)	0.039 (0.049)
Distance from main market (Km)	0.0064 (0.0172)	0.0089 (0.0155)	-0.0184 (0.0150)	0.0291* (0.0174)
Cooperative member (Yes)	0.2632 (0.1717)	0.2871* (0.1654)	-0.0118 (0.1516)	-0.0710 (0.1746)
Quantity of oil crops sold (Qt)	-0.0004 (0.0003)	0.0019*** (0.0003)	-0.0013*** (0.0003)	0.0010*** (0.0003)
Access to credit (Yes)	-0.1331 (0.2230)	0.4807** (0.1992)	-0.5254*** (0.1983)	-0.6392*** (0.2249)
Oilseed Prod. Experience	0.022 (0.014)	0.005 (0.014)	0.005 (0.013)	0.014 (0.014)
Access to extension (Yes)	-0.5917** (0.2651)	0.6542*** (0.2373)	-0.4889** (0.2352)	2.0405*** (0.2855)
Edible Oilseed Type (Groundnut)	0.0431 (0.2637)	0.9246*** (0.2637)	0.5808** (0.2490)	0.9587*** (0.2882)
Access to market info (Yes)	-0.5999** (0.2405)	0.4804** (0.2051)	-0.0606 (0.1968)	0.6452*** (0.2119)
Constant (_cons)	1.1855** (0.5898)	-2.4106*** (0.6119)	1.4480*** (0.5571)	-3.8999*** (0.6295)
Number of observations	383			
Wald chi2(44)	280.22			
Prob > chi2	0.0000			
Log likelihood	-645.7794			

Source: Survey result, 2026

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% probability levels, respectively. Standard errors in parentheses.

Table 5: Correlation Matrix of the Market Outlets (ρ_{jk})

Marketing Channels	Collector(ρ_{1k})	Wholesaler(ρ_{2k})	Retailer(ρ_{3k})	Cooperative (ρ_{4k})
Collector	1.0000			
Wholesaler	-0.2669***	1.0000		
Retailer	0.6323***	-0.3612***	1.0000	
Cooperative	-0.2249**	0.4142***	-0.0445	1.0000
Likelihood ratio test of $\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$				
Chi ² (6) = 148.452, Prob > chi2 = 0.0000 (Significant at the 1% and 5% level, confirming interdependence)				

Source: Survey result, 2026

This study yields a chi² statistic of 148.452 with 6 degrees of freedom, which is highly significant at the 1% probability level ($p = 0.0000$). Farmers producing edible oilseeds are making market outlet choice by comparing market outlets choice that can maximize income. Separate market outlet choices decision is biased and household choice of the four market outlets are interdependent (Gebre, *et al.*, 2020). Individual rho (ρ_{ij}) values represent the degree of correlation between each pair of dependent variables. The estimated correlations show that retailers and collectors ($\beta = 0.6323$ and significant at the 1% level, retailers and wholesaler ($\beta = -0.3612$) significant at the 1% level, cooperative and collector ($\beta = -0.2249$) significant at the 5% level. While wholesaler and collector ($\beta = -0.2669$) is significant at the 1% level and it is ($\beta = 0.4142$) with cooperatives significant at the 1% level. The significant correlations among individual markets outlets choice, as either competitive market out choices and complements market outlets.

Gender of the Household Head: Research conducted in Ethiopia shows that gender of the household heads are a major determinant of the market outlet choices (Sori and Adugna, 2022). This study shows that smallholder with a male headed have positively and significantly probability to choose wholesaler market outlets ($\beta < 0.03950$) at 5% level. Male farmers have better social networks or larger volumes suited for wholesale transactions compared to female farmers. In additions male-headed possess larger land sizes, greater marketable surplus, and better financial capacities compared to female headed on, thus the house with female headed positively and significantly influencing the probability of choosing wholesale market outlets (Legesse et al. 2024).

Distance from the Main Market: The distance from the main market measured in kilometers show a positive and statistically significant impact on the choice of cooperative market outlet choice ($\beta = 0.0291$, $p < 0.10$). The farmers with transportations and other associated cost with the longest distance from the main market have a high probability sell their produce to the cooperative. Cooperatives market outlets pool small quantity of the members to enhance negotiations and generate the highest possible market benefits (Abateneh *et al.*, 2024). As a distance, increases the marginal cost of transportation for quickly reduce the smallholders' farmer availability to the cooperatives markets. This result is also supported with different studies (Sori and Adugna, 2022) and (Gebre *et al.*, 2020). The longest distance from the main market outlet escalate the transportation and handing cost, due to the retail market outlets cannot absorb large volumes smoothly without frequent transport and smallholder farmer with the longest distances from the main market dropout the direct retail markets (Aku *et al.*, 2018).

Cooperative Membership: Cooperative membership by edible oilseeds producers has positive and significant propensity to choose wholesaler market outlet at 10% significance level. Cooperative-affiliated smallholders maintain a high propensity to sell to wholesalers, due to high demand for cash. Cooperatives face intense competition from wholesaler because cooperatives often employ delayed payment systems (Gebre, et al., 2020). Smallholders mostly prefer to sell to wholesalers than cooperative market outlets. Wholesalers paid the price of the product immediate to cover urgent needs. While cooperatives tend to delay payments until the collective produce is successfully sold (Kidu and Tesfay, 2025)

Quantity Sold (Marketable Surplus): Production volume available for the market is an important factor that influences farmers' choice market outlets choices. It reduces the probability to sell to retailer ($\beta = -0.0013$), highly significant at the 1% level. An increase in volume marketed significantly reduces the likelihood of choosing a retailer. As retailers, buy in small fractions, making large-scale sales via retail channels transactional inefficient. Smallholder farmers with larger production volumes are less likely to sell to retailers. Instead, these farmers typically shift toward wholesalers (Abate et al., 2019).

The larger volume produced significantly increase the probability of selling to wholesale market ($\beta = 0.0019$) at 1% level significance increase the likelihood of selling to Wholesalers. Cooperatives ($\beta = 0.0010$) highly significant at the 1% level. Higher marketable surpluses increase the probability to sales to cooperatives, which are structurally designed to aggregate bulk volumes from smallholders. The direct relationship between production size and farmers' decision to sell to wholesalers as their market outlet. This indicates that farmers who have increased their production level and are more commercially oriented with higher marketable surpluses can easily utilize the formal marketing systems (Abate et al., 2019). On the contrary, production size negatively affects the likelihood that farmers using market outlets through retailers. As quantity sold increase, farmers are less likely to sell their products through informal outlets like retail markets. The finding is in line with the findings of (Tura and Hamo, 2018, Dessie, et al. 2018 Mossie et al., 2020, Sori, and Adugna, 2022). Thus, as quantity sold increased, the probability that smallholder to choose high value market outlets will be increased. This implies as the quantity produced increased smallholder to refrain from selling to the retail market outlet and increase the probability to sell the formal market outlet where their margin of benefit increased.

Access to Credit: Access to agricultural credit has strong structural effects across marketing outlets choices. Smallholder those get access to credit increases the probability of selecting Wholesalers ($\beta = 0.04807$) at 5% level, but significantly suppresses participation in Retailer ($\beta = -0.5254$, $p < 0.01$) and Cooperative outlet choices ($\beta = -0.6392$, $p < 0.01$). The smallholder farmer with access to credit most likely choose wholesalers market outlet. Financial endowed farmers increase engagement in more formal and larger-volume oriented markets. On the other hand, access to credit negatively influence the probability to choose cooperative as a market outlets. Farmers having access to credits will rather join less bureaucratic markets than choosing cooperative market outlet. Many smallholders perceive cooperatives as inefficiently managed, subject to political interference, or vulnerable to corruption (Abateneh et al., 2024). If local cooperative leaders are not trusted, farmers are highly unlikely to pool their resources or rely on them for financial management (Molla et al., 2024). Farmers that can easily access credits rarely or not engaged in retailer

markets. This result is consistent with finding of previous study by (Tura and Hamo, 2018 Abera et al. 2016, Claude et al. 2025, Dessie *et al.* 2018) producing farmers which have reported positive association between access to credit and wholesalers being chosen by smallholder farmers for selling the crops. This implies access to finance shapes smallholder farmers marketing timelines. Farmers who gets financial access refrain from selling to the informal market with low marginal benefit and most likely choose to sell their products to high value markets like wholesaler. Access to credit enables farmers to wait, hold inventory and negotiate the optimal price.

Access to Extension Services: Agricultural extension service is an important catalyst in transforming farmers from less to more structured markets. It exerts a highly significant positive effect on the selection of Cooperatives ($\beta = 2.4050$, $p < 0.01$) and wholesaler ($\beta = 0.6542$, $p = 0.01$). Smallholders with access to extension services have higher propensity to choose wholesalers and cooperatives market outlets. Extension agents provide technical and commercial capacity that prepares farmers to meet the volume and quality requirements of these formalized outlets. Simultaneously exerting a strong negative effect on the probability of utilizing Collectors ($\beta = -0.5917$, $p < 0.05$) and Retailers ($\beta = -0.4889$, $p < 0.05$). Access to agricultural extension services reduces the likelihood of selling to local informal collectors or retailers. Extension advice typically steers farmers toward more commercial, structured market outlets (Claude *et al.*, 2025). It indicates access to agricultural extension services decrease the problems of information asymmetry, reduce transaction costs, and enhance farmers' integration into structured marketing systems (Legesse, et al. 2024). Access to agricultural extensions services positively influenced farmers' decision to choose on cooperative as market outlet. Access to agricultural extension service, the probability to engaging in collectors and retailers market outlets This finding aligns with previous studies, for instance, by (Mossie et al. 2020; Marie *et al.*, 2025, Ashebir *et al.* 2025) on market outlets choices. Development agents are educating smallholder farmer on collective marketing benefits and encouraging smallholder farmers to choose cooperatives and refrain from those informal like markets like collectors and spot retail markets (Kidu, and Tesfay, 2025)

Access to Market Information: The findings indicate access to market information positively affect farmers to choose cooperative market outlet as part of organized and rewarding marketing. Access to formal market information significantly enhances smallholder participation in wholesaler ($\beta = 0.4804$, $p = 0.05$) and cooperative market outlets ($\beta = 0.7674$, $p < 0.01$). Farmers with reliable market information are have a probability to choose wholesale and cooperative outlets. Market information's increase the awareness on prices empowers them to negotiate and participate in institutionalized bulk markets. Whereas, significantly reducing reliance on local collectors ($\beta = -0.5999$, $p < 0.05$). Access to market information decreases the propensity to sell to collectors. Informed farmers tends refrain to sell products to local markets out who often offer lower prices. Farmers with access to market information prefer to sell their produce cooperative markets outlets. Thus, the availability of adequate market information plays a vital role in facilitating farmers' involvement in organized marketing processes. Availability of market information has a negative impact on marketing through informal outlets. Farmers becomes unlikely to sell products to collectors. This result is consistent with the finding of prior studies (Emana *et al.* 2015, Adugna *et al.* 2019, Ermias 2021, Legesse *et al.* 2024). Collectively, all these studies show that access to market information significantly enhances farmers' likelihood of

participating in formal, high-value market outlets (Legesse *et al.*, 2024). Access to market information reduce information asymmetric and enhance with clear price data.

Edible Oilseed Type (Groundnut vs. Soybean): Smallholder farmer producing groundnuts significantly increases the probability of selling to wholesalers ($\beta = 0.9246$, $p < 0.01$), cooperative unions ($\beta = 0.9587$, $p < 0.01$), and retailers ($\beta = 0.5808$, $p < 0.05$). Farmers producing groundnuts have multi positive market outlets. Groundnut farmer operates within mature value chain. Soybean producing farmers market remains chained to niche institutional arrangements, as compared to the well-established groundnut market. Groundnuts producing farmer has diverse and competitive market outlets (Alemaw and Gurmu, 2023). Edible oilseed producers are able to complete transactions quickly and with little difficulty because they have spent decades building strong, trust-based informal relationships with informal market outlets like retail and makes them to integrate into official farmer organizations, like cooperative networks and wholesaler (Gebre *et al.*, 2021; Legesse *et al.*, 2024). The study by Gebremedhin, and Hoekstra, (2009) also corroborated the same finding whereby farmers were found to be less restricted to a single market outlet and rather open to strategically choosing multiple market outlets.

Conclusions

Market outlet choices among smallholder in the East and West Hararghe administrative zones are interdependent decision-making processes. Agricultural extension services, reliable market information, and formal credit access act as critical catalysts that steer farmers away from opportunistic, low-value markets outlets like informal collectors and spot retail markets. Successfully integrating the producers into structured, high-value wholesale and cooperative outlets by reducing transaction costs and eliminating information asymmetry increase their utility. Furthermore, larger marketable surpluses systematically drive smallholders toward volume-oriented formal networks and reduce the probability to sell to informal market outlets. However, a prominent institutional friction exist like, cooperative members smallholders maintain a high propensity to side sell to wholesalers, due to urgent household liquidity constraints than delayed payment systems typical characteristics of cooperatives. Value chains are highly crop-specific; the mature groundnut sector in East Hararghe operates within a versatile, highly commercialized, multi-channel market structure, compared to newly introduced soybean sector in West Hararghe.

To optimize the market outcomes of edible oilseed smallholders in the study area, a coordinated policy approach must integrate institutional, financial, and value chain interventions into a cohesive strategy. First, agricultural cooperatives must upgrade their financial structures by designing flexible, competitive marketing mechanisms such as offering immediate cash advances upon crop delivery to effectively mitigate member side-selling driven by urgent household liquidity constraints. Complementing this, financial institutions and policymakers should expand flexible rural production and marketing credit lines to eliminate binding cash constraints, thereby enabling smallholders to hold inventory, negotiate optimal prices, and transition away from fragmented retail outlets. Agricultural extension services and market information must be enhanced to provide smallholders with dynamic, real-time market price data, empowering remote farmers to bypass opportunistic intermediaries. Finally, edible oilseeds type targeted value chain interventions that focus on upgrading West Hararghe emerging soybean market pathways.

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Consent to participate: Informed consent was obtained from all individual subjects included in this study. All survey respondents were fully informed about the study's purpose, the voluntary nature of their participation, and data security procedures. Participation was restricted to individuals aged 18 or older who provided informed consent prior to the commencement of the interviews.

Consent to publish

Not applicable.

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