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Original Research

Determinants of Sesame Market Supply in Haro Limu District, East Wollega Zone, Oromia Region, Ethiopia

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Abstract

With an emphasis on identifying key determinants of market supply, this study investigated the variables affecting sesame supply in the Haro Limu district. The data sources used were both primary and secondary. 154 smallholder sesame growers were chosen at random to provide primary data. For data analysis, a multiple linear regression model and descriptive statistics were used. The average amount of sesame delivered to the market was 5.38 quintals, according to the data, and the model had a significant explanatory power with a coefficient of determination (R^2) of 90%. The results of the regression analysis showed that factors like age, education level, farming experience, usage of enhanced seed types and access to market knowledge all had a positive and substantial impact on the supply of sesame. On the other hand, it was discovered that the quantity of sesame supplied was negatively, and significantly impacted by the distance to the closest market. In order to increase farmers' market involvement and bargaining power, the study suggests strengthening their understanding of market procedures, developing rural infrastructure, and promoting the creation of farmer groups or cooperatives.

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INTRODUCTION

Agriculture is the main source of income for societies in many nations, including most less developed countries (LDCs). In these countries, it employs more than half of the workforce and supports industry and commerce through the supply of raw materials and as a market for finished goods (FAO, 2021; World Bank, 2021). In Ethiopia, agriculture is the main industry driving economic growth. It is the largest source of foreign income, accounting for 90%, and it employs almost 83% of workers. However, the sector still faces low productivity and limited market integration (Kefyalew, 2012).

Most people agree that the best way to combat poverty in the developing nations is through commercial farming (Ogutu et al., 2017). Empirical evidence suggests that a 1% increase in agricultural productivity can reduce the proportion of people living below the $1 per day poverty line by 0.6% to 2% (Asfaw et al., 2012). A series of regional meetings in 2006 and 2007 that highlighted the need for market-oriented change boosted policy talks on agricultural commercialization in Ethiopia. The gradual shift from domestic production for personal consumption to market-oriented production, the expansion of market-oriented input utilization and production patterns, and the separation of domestic production and consumer choices are all examples of agricultural commercialization (Abera, 2009).

Ethiopia's oilseed industry significantly boosts market players' well-being along the entire value chain as well as foreign exchange revenues. Sesame, soybean, and Niger seed oilseeds account for about 17% of Ethiopia's agricultural exports, making oilseed crops the third-largest source of foreign exchange earnings behind coffee and cut flowers. Soybean, sesame, and Niger seed exports generated $376 million in foreign exchange gains for the 2019–20 marketing year. Approximately 1.4 million smallholder farmers nationally cultivate oilseed crops, according to the Central Statistics Agency (CSA).

Sesame (*Sesamum indicum* L. Pedaliaceae), is believed to have originated in Africa (Ram et al., 1990). Globally, sesame is predominantly produced in India, China, Myanmar, Sudan, and Ethiopia, which fall within tropical agro-ecological zones. China is the world's greatest producer of sesame, accounting for an average of 21.4% of global production. While India has the largest cultivation area, with an average of roughly 23.6% of the global area. Together, these countries accounted for about 63.4% of global sesame production between 2000 and 2005. Sudan is also a major exporter in Africa, contributing approximately 18.3% of global sesame export revenue.

In Ethiopia, sesame became a major cash crop in the 1990s, particularly in the northern and northwestern regions bordering Sudan and Eritrea. According to the Ministry of Trade and Industry (MOTI), in 2020/21, the Amhara region produced 44% of national sesame

production, followed by Tigray (31%) and Oromia (13%), while Benishangul-Gumuz, SNNP, and Gambela contributed 9%, 2%, and 1%, respectively. In the same year, sesame exports were estimated at 213,000 metric tons, showing a slight decline compared to the previous year. This reduction has been attributed to increased domestic processing and a contraction in production (CSA, 2021).

Price trends in the Ethiopian Commodity Exchange (ECX) indicate fluctuations in sesame markets. In February 2021, the average price of Whitish Humera/Gondar sesame reached USD 1,371 per metric ton, compared to USD 1,324 in February 2020, representing a 4% increase. Similarly, Whitish Wollega sesame increased by 6% during the same period. However, during the 2020/21 marketing year, average export and domestic prices declined by 6.5% and 2.3%, respectively (CSA, 2021). Overall, agricultural productivity growth in Ethiopia remains insufficient to match population growth, leading to persistent supply-demand gaps.

Despite its strong production potential, sesame production in Ethiopia faces multiple constraints, including pests and diseases, drought, limited availability of improved varieties adapted to different agro-ecologies, inadequate post-harvest handling practices, weak agro-processing capacity, and high market volatility. In addition, insufficient attention to sesame research compared to staple crops such as maize and wheat further limits productivity gains. Although smallholder commercialization has been promoted as a key development strategy, many farmers remain engaged in subsistence-oriented production due to limited capacity to manage production and price risks (Boka & John, 2017).

The majority of smallholder farmers in Haro Limu District are not involved in the production and sale of sesame. This suggests that certain households are prevented from participating by both internal and external factors. Farmers' engagement levels vary widely; therefore, the total amount of participation cannot be compared to the potential that is accessible. Furthermore, farmers deal with a variety of marketing issues that impact the revenue that growers could receive from the sale of sesame seeds (Kefyalew, 2012).

Sesame is one of the major crops produced and marketed in Haro Limu District. There are 2,591 hectares of land suitable for sesame production in the district. Out of this, 2,300 hectares were cultivated with sesame during the 2020 production year, while 291 hectares remained uncultivated for sesame production. In the same year, the district supplied 32,500 quintals of sesame to the market (Haro Limu Agriculture Office, 2021). Previous studies were conducted in other areas such as Melokoza District, Southern Ethiopia (Goshme et al., 2018), and Humera, Tigray (Gebremedhin et al., 2019), but no study has been conducted in Haro Limu District.

Thus, the aim of this study is to evaluate the amount of sesame supplied to the market and pinpoint the main variables affecting market supply among smallholder farmers in Ethiopia's Oromia Region's Haro Limu District. In particular, the study evaluates the factors influencing the amount of sesame provided to the market and examines the socioeconomic and demographic traits of sesame growers.

RESEARCH DESIGN

Overview of the Research Area

One of the woredas in Ethiopia's Oromia Region is Haro Limmu. The East Wollega Zone includes it. The Limmu woreda was cut off from it. It is bordered to the east by Limmu, to the west by Benishangul-Gumuz Region, to the south by the Anger River, and to the north by Ibantu. The district's administrative hub is Haro. The Haro Limu district was located 165 kilometers from the zonal headquarters of Nekemte and 488 kilometers from the capital, Addis Ababa. The East Wollega Zone consists of 17 districts, including Haro (Figure 1). There are two urban kebeles and seventeen rural kebeles in the district. The zone has a lowland/kolla agro-ecology with temperatures between 14 and 26 degrees Celsius. Bush scrub and grassland are the most observed vegetation in the Livelihood Zone. It receives 1000-1500mm of rainfall per year (unpublished data of Haroo Limu District).

The Livelihood Zone has two rainy seasons, namely, Arfasa and Genna. The population density of the zone is moderate. Sandy loam and loam soil are the dominant fertile soil types and because of this and other factors, the Livelihood Zone production potential is high. Production is entirely rain-fed. *Genna,* the rainy season from June to August, is very important for crop production. In this district, there is 78217-hectare land that is comfortable for crop production service, 7103-hectare land was used for livestock service, and 4953-hectare land was covered by forests. In addition to this, the district was known for livestock production. The total livestock production last year was 332332. Maize, Sorghum, Finger Millet, Haricot bean, Sesame, and Ground Nut are crops grown in the LZ (Livelihood Zone). Sorghum, maize, and finger millet are crops grown for consumption while sesame and groundnut are grown for income purposes. In the Livelihood Zone, sorghum and maize also serve as a source of income (Haro Limu Agricultural office 2020).

52,163 people were living in this woreda as of the 2007 national census, with 26,052 males and 26,111 women. Protestantism was the most common religion among the residents (54.07%), followed by Ethiopian Orthodox Christianity (28.79%) and indigenous religions (9.21%).

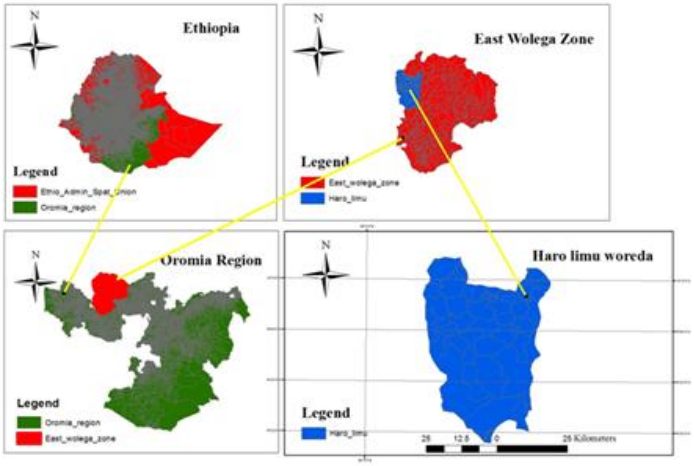

Figure 1. Study area map.

Methods for Sampling and Calculating Sample Size.

Table 1 shows the distribution of sampled households by kebele. The sampling approach was applied in three stages. The district of Haro Limmu was purposefully chosen for the first stage due to its potential for sesame cultivation. Because the district's smallholder farmers were uniform, three kebeles were chosen at random from a total of 17 kebeles in the second stage. Finally, a basic random selection technique was used to select 154 sesame producer sample farmers from each kebele probability, proportional to size. The study used the sample size determination formula provided by Yamane (1967) as follows in order to acquire a representative sample size:

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

Where: n = sample size, N = population (number of sesame-producing households in the district (8652)) and e = precision level (8%). Furthermore, Yamane's formula was applied due to the study's homogeneous population. of the research region.

Table 1. Distribution of Sample Households by Kebele.

No	Kebele	Agro-climatic conditions	Sesame producers	Proportion	Sample size
1	Homii kalala	Medium	708	0.36	55
2	Gorba Gudina	low land	719	0.37	57
3	Sagiro Gudina	Low land	529	0.27	42
Total			1956	1	154

Data types, data sources, and data collection techniques.

In order to gather both quantitative and qualitative data for this study, primary and secondary sources were used. Primary data on socioeconomic indicators, such as market information, livestock holding units, extension visits, credit availability, demographic characteristics, and access to extension services, were collected using a semi-structured questionnaire given by trained enumerators. An informal survey was conducted to gather some preliminary data regarding the district's overall farming system prior to the main data collection process. Questionnaires, and the questionnaire were pre-tested after the necessary adjustments and changes were done. Reviewing pertinent sources, including records from the district's office of agriculture and other pertinent organizations, allowed for the collection of secondary data. The number of respondents for the pretest questionnaire was collected from 4 sample households.

Data analysis methodology.

Both descriptive and econometric techniques were used in this study's data analysis. The characteristics of the sampled households were meaningfully summarized and presented using descriptive statistics, including mean, percentage, frequency, and standard deviation. Additionally, the factors influencing the supply of sesame were examined using a Multiple Linear Regression model.

The volume of sesame supplied to the market was treated as the dependent variable and examined using the Ordinary Least Squares (OLS) estimation technique under the Multiple Linear Regression framework. This approach is appropriate because all sampled households were sesame producers and actively participated in sesame marketing. Therefore, the model was considered suitable for analyzing the determinants of the volume of sesame supplied to the market in the study area.

Econometric model analysis

A Multiple Linear Regression model was used in place of other limited dependent variable models since every sesame producer in the research area is focused on the market and actively engages in selling. To investigate and forecast the link between one dependent variable and two or more explanatory variables, multiple linear regression fits a linear equation to observed data. Every value of an independent variable (x) in this situation is linked to a matching value of the dependent variable (y). The amount of sesame delivered to the market is considered the dependent variable in this study. The Ordinary Least Squares (OLS) approach was used to estimate this relationship. OLS is a widely used statistical technique for modeling a single response variable measured on at least an interval scale, using one or more explanatory variables. These explanatory variables may be continuous or categorical, provided that categorical variables are appropriately coded. By minimizing the sum of squared residuals, the OLS approach calculates the unknown parameters of the linear regression model (Hutcheson, 2011).

The formal multiple linear regression model for this study can be written as:

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_p X_{ip} + \varepsilon_i$$

Where: Yi = Volume of sesame supplied to the market, β = Coefficient of i^{th} explanatory variables, Xi = Vector of explanatory variables and ϵ_i = Disturbance Term.

Accordingly, the OLS estimation method was used to identify the determinants affecting the quantity of sesame supplied to the market among smallholder farmers in the study area. The model enables the estimation of the direction and magnitude of the effect of each explanatory variable on the sesame market supply while holding other factors constant.

Determinant of Sesame Market Supply

The Dependent Variables.

Volume of sesame supplied to the market: Equations for multiple linear regression models employ this continuous dependent variable. It shows the actual amount of sesame provided to the market during the 2024 production year and is measured in kg.

Independent Variables.

Table 2 summarizes the expected signs of explanatory variables.

Age of the household. It is a continuous variable that may be used to gauge farming experience. This is due to the fact that one's place in the family hierarchy influences their decision to engage in the market. The number of years is a continuous variable that is used as a stand-in to show the sample household's overall agricultural experience. According to this interpretation, a farmer's proficiency in production techniques and resource allocation improves with age Gebremedhin & Tegegne (2012). Therefore, it is hypothesized that middle-aged households were less inefficient in sesame production than others. So, it was expected that older households would be more market-oriented and have a higher market supply.

Family size (FAMSIZ): The total number of family members living in the home is represented by this continuous variable. Family is a significant source of labor, with man-equivalent productivity. With a big family, the farmer would be able to manage crop plots on time because labor is the primary input in crop production. Therefore, it is anticipated that the size of the family will positively impact the farmer's efficiency. Family size has a favorable and significant impact on farm-level sesame supply at a 5% level of significance, according to Goshme et al. (2018). The availability of an active labor force in a household influences the supply of sesame to the market; this was assessed in man-equivalents.

Extension contact (EXTN) Extension services range from offering technical guidance on farming matters, including what, how, and when to produce, to enabling the availability of credit and input supplies, as well as giving farmers market information and training to increase their capacity (Abera, 2009). The number of extension contacts that the household received throughout the 2012 production year is represented by the extension contact. Access to extension services improves farmers' knowledge, which boosts output and is anticipated to positively correlate with the amount of sesame market supply. It is a continuous variable that is measured.

Livestock holding excluding oxen and equines: In terms of Tropical animals Units (TLU), it is a continuous variable that is defined as the total quantity of animals owned by the family, excluding oxen and horses. It's unclear how owning livestock aside from oxen and horses affects market orientation and supply volume (Gebremedhin & Tegegne, 2012).Their capacity to recruit or purchase inputs on time reflects this. Consequently, it is anticipated that the volume of the sesame market supply was adversely impacted by livestock size.

Number of oxen owned. The number of oxen owned by respondents throughout specific production years (2020/21) serves as a measure of

the continuous variable. It is anticipated to have a favorable correlation with the amount of sesame market supply. Additionally, some writers made similar hypotheses (Abera, 2009; Gebremedhin & Jaleta, 2013).

Land Allocation for sesame: Both market orientation and the amount of supply in the sesame market are favorably and statistically significantly impacted by this continuous variable. The household allots land for the production of sesame. According to Goshme et al., (2018), they investigated the factors influencing the supply of sesame in the market. Sesame market supply was positively and dramatically impacted by the land allotted for sesame. Keeping other things equal, the study found that an increase in the size of one hectare of land planted to sesame led to a 68 kg increase in the farm-level market supply of sesame.

Distance to nearest market. It is a continuous variable that is the distance, expressed in kilometers, between farmers and the closest market. The amount of supply in the sesame market was adversely and considerably impacted(Goshme et al., 2018),Distance from the closest market had a negative and considerable impact on the market supply of sesame, according to the model's results.

Market Information. Another crucial element in the commercialization of farming is market intelligence. As a dummy variable, it was measured. Before the production season begins, farmers must have knowledge of output prices in order to decide which crops to grow and sell and which to buy from the market Abera (2009). So it was expected to have a significant and positive effect on market supply.

Level of Education. It is a continuous variable that is used as a stand-in for the managerial competence of input and is expressed in years of education of the household head. It is believed that education raises the caliber of work and makes people more willing to embrace new technology. Holloway et al. (2000), claimed that the amount of milk sold in the Ethiopian highlands was significantly improved by education. Having access to education and gaining more experience could help improve farm operations management.

Experience growing sesame. This continuous variable may have both positive and negative effects on the volume of the sesame market supply. Because they are believed to have better skills, information access, and information processing capacities, experienced households may have a favorable correlation with market orientation and market supply. According to Babu's (2018) study, the supply of the sesame on the market and farmers' agricultural experiences are positively correlated. The marketable supply of sesame rose with an increase in the one-year production experience.

Credit Service. It's a dummy variable, and it was positively and significantly affected. According to (Goshme et al., 2018), at the 5% level of significance, this variable had a significant and favorable impact on the quantity of sesame sold. The market supply of the sesame will increase if the household has access to credit services because they will have enough money to purchase modern inputs and pay for seasonal labor.

Equine owned: The number of horses owned by the household during specific production seasons (in this case, 2020) was one of its continuous variables. Because it lowers transportation costs, it is anticipated to increase market orientation and the volume of the sesame market supply. Additionally, some writers made similar hypotheses (Abera, 2009; Gebremedhin & Jaleta 2013).

Input cost for production; It is anticipated that smallholders' market orientation will be negatively correlated with its continuous independent variable and measure in Ethiopian birr. According to Weldeyohanis et al. (2017), the market orientation of malt barley and the input cost of production are negatively correlated.

Selling price (Price): Ethiopian Birr is used to measure this continuous variable. It is anticipated that the higher price will result in a greater supply of sesame on the market. Kefyalew (2012) postulated and discovered that the market price had a favorable impact on the revenue generated from sesame sales in Diga District.

Improved seed variety. With a positive and statistically significant value, this variable was significant in influencing the sesame market's volume. If the sampled household used enhanced seed variety 2, the variable was dummy; if not, it was dummy variable 1 (Girmay, 2018).

Table 2: Summary for hypothesis expected sign

No	variable	Variable type	Sesame market supply
1	Age of the respondent	Continuous	+
2	Sex of the household	Dummy	+
3	Family size.	Continuous	+/-
4	The educational level	Continuous	+
5	extension Service	Continuous	+
6	Sesame farming Experience	Continuous	+
7	Access to market information	Dummy	+
8	Distance to market center	Continuous	_
9	Land Allocation for sesame	Continuous	+
10	Access to credit service	Dummy	+/-
11	Livestock holding excluding oxen and equine	Continuous	+/-
12	Number of oxen owned	Continuous	+
13	Number of equine own	Continuous	+
14	Input cost	Continuous	-
15	Selling price	Continuous	+
16	Improved seed variety	Dummy	

Source: Authors' definition; 2025

RESULTS AND DISCUSSION

Demographic Characteristics of the Respondents.

Every responder in the sample supplied sesame to the market. Table 3 shows that the respondents' ages ranged from 20 to 62 years, with a mean of 44.4 and a standard deviation of 8.9. As a result, the farmer household might be considered young and part of the nation's economically engaged group. A young family's home is more dynamic due to technological adaptability. As a family labor supply for production activities, the total number of adults in the household who help on the farm has a beneficial impact on the district's sesame market supply. Sesame was not consumed domestically, but the increase in family size may lead to a tendency to consume, which lowers the level of market supply. The average family size of all respondents studied was 7.79, with a range of 2 to 14 individuals. Additionally, the vast majority of respondents (88.3%) were married. This suggests that the vast majority of married respondents come from households that grow sesame to boost their income and expertise.

Knowledge comes from experience, and farmers with greater experience are thought to be more productive, allowing them to supply a larger quantity of sesame than those with less experience and to be more focused on the market. The homes of sampled farmers with farming experience range from 2 to 17, with an average age of 8.64 years. This suggests that seasoned farmers produce and provide the market with a comparatively higher volume of sesame produce.

Table 3. Age, family size, farming experience, and educational status of the respondent.

Descriptive Statistics					
Variable	**N**	**Minimum**	**Maximum**	**Mean**	**Std. Deviation.**
Age of the respondent	154	20	62	44.44	8.999
Family size of respondent	154	2	14	7.79	2.842
Educational background of respondent	154	0	12	5.25	3.556
Sesame farming experience of respondent	154	2	17	8.64	3.331
Valid N (listwise)	**154**				

Source of own computation from survey result, 2025

Of the households sampled, 36.4% were headed by women and 63.6% were headed by men. The average percentage of female household heads is higher than the 21% national average (FAO, 2018). This suggests that males head the majority of the households in the studied area. The heads of those female households did not participate equally in the supply of sesame in the market. This is because of various social reasons that restrict women's participation in the sesame market supply. Since sesame is a cash crop, women almost exclusively create goods for household use. Compared to their male-headed counterparts, those households with a female head are less focused on the market.

The most effective tool available for combating poverty is education. The leader of the family can find an effective market for their production and acquire new knowledge about manufacturing. Furthermore, education plays a significant role in the decision-making process. The majority of the household heads in this district have an average of 5.25 years of schooling and are literate. This exceeds Ethiopia's national average of two years (FAO, 2018).

Table 4. Descriptive summary of a dummy variable.

Variable		Frequency	Percent
Credit used	No	68	44.2
	Yes	86	55.8
Access to information	No	59	38.3
	Yes	95	61.7
Sex	Female	56	36.4
	Male	98	63.6
	Total	154	100

Source: own survey result 2025

Socio-Economic and Institutional characteristics of HHs.

Table 4 presents descriptive summaries of dummy variables. For farmers, access to credit is crucial. Due to the possibility that farmers lack the source for production-related inputs. within the study space. Oromia Credit and Saving Share Company is the farmer's source of credit. According to the descriptive statistics, during the production season, 55.8% of the studied households had used credit, while the remaining 44.2% had not.

Increasing market supply and market orientation requires improving and disseminating knowledge about the agricultural sector. Additionally, it raises farmers' awareness of how to determine their input and production prices. Of the farmer tested households, 38.3% lacked access to market information, but the remaining 61.7% had access to information on prices, quality, and market demands from friends, neighbors, and traders. The sampled household's average travel time to the closest market, measured in kilometers, was 13.01, with minimum and maximum travel times of 7 and 21 km, respectively.

The Ethiopian government constructed a farmer training center in each peasant's area in order to achieve food self-sufficiency. Aside from this advancement, the agent provided farmers with superior extension services. In the production year, 76% of the households in the sample required one to five extension services, while the remaining 24% did not.

Table 5. Socio-economic Characteristics of the Respondent.

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Amount of sesame sold by respondent	154	1	9	5.38 qt	2.055
Price of sesame in the last year	154	2500	3900	3033.57	301.254
Amount of land allocated for sesame	154	1	5	2.55	1.14

Source: Own computation 2025

Without land, no agricultural product could exist. It is the most crucial fixed element in the production system, whether it is owned or rented. As shown in Table 5 the average amount of land allotted for sesame production is 2.55 hectares with 1.14 standard deviations, ranging from 1 to 5 hectors. For tiny households, mixed crop-livestock production systems are a crucial risk-coping strategy. In the majority of Ethiopian rural households, livestock is their most valuable asset. To facilitate comparability, the quantity of animals was transformed into tropical livestock units excluding oxen and equines (TLUEOE) using standard conversion factors. According to the descriptive result, the sampled respondents had an average of 4.2 total livestock units (excluding oxen and horses), with a standard deviation of 3.1 and a range of 2 to 11. The outcome is significantly greater than the 2.4 TLU average tropical livestock unit held by Ethiopian pastoralists (FAO, 2018). Sesame farmers made an average of 3033.57-birr 100kg in the district market, which ranged from 2500 to 3900 with a standard division of 302.928. Farmers complained that the price of sesame was extremely low, given how difficult it is to grow.

Econometric Result.

The Volume of the Sesame Market Supply.

Before the multiple linear regression model was run, the independent variable was examined for the existence of the multicollinearity problem, which is the situation where repressors are related to each other. This was assessed using the variance inflation factor (VIF), and contingency coefficient tests were utilized for discrete and continuous variables, respectively. Depending on the result, there is no discernible multicollinearity among the independent variables.

The results indicated that heteroscedasticity was present, as determined by the Breusch-Pagan heteroscedasticity test. To solve this problem, all model results were estimated and corrected using robust standard errors. After adding fifteen factors to the regression model and running a number of statistical tests, the predicted coefficients of significant variables were interpreted and shown.

The model's R-square indicates that it has a 90% overall significant fit. The quantity of the sesame market supply was the dependent variable.

At different probability levels, only seven of the fifteen factors that were postulated and entered into Stata software were found to significantly affect the predicted variable. Key factors that positively and significantly affect the quantity of sesame market supply include the household's age, educational background, agricultural experience, access to market information, improved seed variety, and equine ownership. On the other hand, distance from the market has a negative and significant effect. ***In*** contrast to the expectations, the sex of the household, land allocated for sesame, extension service, family size of the household, ***credit service,*** oxen, price of sesame, and total livestock unit does not significantly affect the volume of sesame market supply.

Educational status of the household (EDS)

At the 1% level, the regression's findings indicate a positive and statistically significant correlation between the household head's educational attainment and the amount of sesame market supply. since the knowledgeable farmer is aware of how to obtain information about which products are suitable for the market. If the sesame producer learning status was increased by one grade level, the volume of the sesame market supply increased by 0.12 quintals, other things remain constant. This result is in line with Melaku & Ashalatha (2016), Studied on determinant sesame market supply on Tigray region and determinant teff and wheat market supply.

Table 6. Multiple linear regression results of the volume of sesame market supply.

Amount of sesame sold	Coef.	Robust Std. Err.	t	P>t
Sex	.1405729	.1637807	0.86	0.392
Age	.0172568*	.0096704	1.78	0.077
Family size	-.0162394	.0386552	-0.42	0.675
Education background	.1248044***	.042432	2.94	0.004
TLU	-.017096	.0186669	-0.92	0.361
Farming experience	.1102091***	.02973	3.71	0.000
Credit service	.1016649	.1100529	0.92	0.357
Extension service	-.0284405	.0609894	-0.47	0.642
Distance to market	-.0671072**	.0287383	-2.34	0.021
Price of sesame	-.000144	.0002136	-0.67	0.501
Land allocate sesame	.1684888	.1254209	1.34	0.181
Market info	.3703854**	.177408	2.09	0.039
Oxen Owen	.1003593	.06732	1.49	0.138
Equines	.3599072**	.1613197	2.23	0.027
Improved seed variety	.6000284***	.1472255	4.08	0.000
_cons	**1.454654**	**1.208375**	**1.20**	**0.231**

***, ** and * shows significance level at 1%, 5%& 10% respectively. R^2 =90%

Source: Own computation from survey result, 2025

Frame experience of the respondent (FEX)

Farming skills had a good and considerable impact on the volume of the sesame market supply at the 1% level. If the household head's years of experience increased by one year, the volume of sesame market supply increased by 0.11 quintals while all other variables remained the same. The positive coefficient of the sesame producer's production experience shows that the marketable supply of sesame rises as the producer's one-year production experience increases. According to this variable, households with at least a year of expertise in producing sesame were able to produce more of the crop and supply more of it to the market than households with less production experience. This result is in line with Babu (2018), which Studied on Determinant of sesame market supply in the Tigray region.

Age of the respondent (Age)

The variable and the quantity of sesame market supply are positively and significantly correlated at the 10% level. When a household's age increases by one year, the volume of the sesame market supply rises by 0.017 quintals, all other things being equal. This result is in line with Gebremedhin & Hoekstra's (2008) research on Ethiopian household market participation and cereal marketing.

Distance from nearest market (DSFM)

At the 5% level, the supply of sesame was negatively and statistically significantly impacted by the distance to the closest market. A one-kilometer increase in distance decreased the amount of sesame given by 0.067 quintals, all other things being equal. This is because farmers who are farther from markets have to pay more for transportation, spend more time traveling, and have less access to market information, all of which lower market participation. This result is consistent with reports by Makhura et al. (2001) that a larger market distance reduces marketable surplus.

Access to market information (AMI)

The results of the study show that the availability of market information and the quantity of sesame market supply are positively and significantly correlated at the 5% level of significance. 0.37 quantiles more sesame was given by farmers who had access to market data than by those who did not. The outcome is in line with the findings of Martey et al. (2012), who revealed that market data ensures producers receive insights on market demands and opportunity sets that help farmers make efficient plans. In line with the result of Adenegan et al. (2013), farmers will pay less for transactions if they have more knowledge about the market's location, product prices, and supply and demand conditions for produce. This will increase their degree of market involvement.

Equines Ownership (EQO)

At the 5% level of significance, the study's findings showed a positive and statistically significant relationship between the volume of sesame market supply and equine ownership. Sesame is transported by horses from the producing site to the marketplace. Because it creates location utility, the availability of transportation amenities is crucial. When the number of horses grew by one, the amount of sesame market supply increased by 0.35 quintals, while everything else stayed the same. This result is in line with Gebremedhin & Hoekstra's (2008) research on cereal marketing and household market participation in Ethiopia, which revealed a positive and substantial correlation between the number of horses owned and the percentage of wheat sold in the market.

Improved seed variety

At the 1% significance level, the volume of the sesame market supply was positively and strongly impacted by this variable. Other factors remained the same, the amount of sesame supplied to the market increased by 0.6 quintals when smallholder farmers utilized improved sesame seed varieties. When compared to other crops like maize, teff, and wheat, this suggests that the number of households in the study using sesame was quite low. When compared to other nations, Ethiopia's sesame types were incredibly underproductive. This finding was in line with Girmay (2018) on Sesame Production, Challenges and Opportunities in Ethiopia.

CONCLUSION

The factors influencing the supply of sesame in the Haro Limu District, East Wollega Zone, Oromia Region, Ethiopia, were investigated in this

study. Each household received 5.38 quintals of sesame on average. Seven of the fifteen variables examined had a substantial impact on the supply of sesame, according to the multiple linear regression results. The amount of sesame supplied was positively and significantly impacted by age, education level, agricultural experience, usage of enhanced seed kinds, access to market knowledge, and horse ownership. On the other hand, the distance to the closest market had an adverse effect. Compared to homes headed by women, households headed by men supplied more sesame to the market. In a similar vein, higher volumes of sesame were supplied by farmers with greater education, experience, and access to market knowledge. Farmers owning more oxen and equines also supplied more, as these assets support production and transportation.

Improve education and training: Adult education and farmer training programs should be strengthened, as education and farming experience increase market supply. Strengthen extension services: Farmers should be supported with guidance on allocating land efficiently for sesame production alongside other crops. Ensure access to improved seeds: The government should improve the supply and accessibility of improved sesame seed varieties for smallholder farmers. Improve rural infrastructure: Since distance to markets reduces supply, better road construction and maintenance are needed to ease transportation. Enhance market information systems: Farmers should have better access to timely and accurate market and price information to encourage market-oriented production. Support access to farm resources: Credit services should be expanded so farmers can afford oxen and equines, which are important for ploughing and transport. Promote cooperatives: The government should encourage the formation of farmer cooperatives to improve market access, bargaining power, and opportunities for reaching larger markets, including international ones.

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CONFLICT OF INTEREST

There are no conflicts of interest to disclose.

Data availability statement

The datasets used and/or analyzed in the current study are available upon reasonable request from the corresponding author.

Author Contribution: Both have prepared the materials, gathered the information, and carried out the analysis. Both authors reviewed and approved the final manuscript.

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