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Research Article

Determinants of Sesame Market Supply in West Omo and Bench Sheko Zones, Southwest Ethiopia

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Farmers depend on sesame farming as their major source of income in West Omo and Bench Sheko zones. However, they face diverse marketing challenges to deliver their product to the market. Therefore, the study aimed to investigate the variables that affect sesame market supply in West Omo and Bench Sheko zones. The study's data were gathered from primary and secondary sources. Multistage random sampling was employed to select 270 sample sesame producers. The analysis was done using descriptive statistics as well as econometric models. Multiple regression model results showed that total livestock unit, sesame farming experience, cooperative membership, family size, land under sesame, annual off-farm income, participation in training, and distance to the nearest market significantly affected the amount of sesame supplied to the market. The study recommends strengthening sesame producer cooperative, promoting experience sharing among experienced farmers, improving transportation accessibility and infrastructure development, increasing productivity by fortifying extension service providers, and encouraging sesame producers to participate actively in various trainings.

1. Introduction

Sesame (*Sesamum indicum*) is a prominent, hot-season annual plant resistant to drought and thrives on stored soil moisture [1]. It is an oil-rich seed crop with enormous economic value since its seeds contain 46–56% of high-quality oil, which is prized by the food, chemical, and pharmaceutical sectors [2]. Sesame is a popular food crop for providing edible oil and for domestic and foreign markets [3]. According to FAO [4], global sesame production passed 5.5 million tonnes in 2017, with Africa producing 57% and Asia producing 40%. Consumption of sesame quickly increases worldwide due to shifting consumer preferences and increased health consciousness [3]. Sesame seed consumption in the world in 2018 was 6559 million USD, and it is forecasted to rise to 7245 million USD by 2024, with a compound annual growth rate of 1.7% [5].

As stated by FAOSTAT [6], Sudan (1,525,104 tons), Myanmar (740,000 tons), the United Republic of Tanzania (710,000 tons), India (658,000 tons), and Nigeria (490,000 tons) were the top global sesame seed producers. Ethiopia ranked the 8th and 5th largest producer of sesame seed globally and in Africa with 260,258 tons in 2020. As indicated by FAOSTAT, Ethiopia placed 4th in sesame seed exports in 2020 with 228,089 tons. Sudan was the world's largest exporter (492,351 tons), followed by India (276,265 tons).

The oilseed sector in Ethiopia significantly contributes to the country's foreign exchange earnings. Sesame, soybean, and niger seed, Ethiopia's three main oilseed crops, account for nearly 20% of total agricultural export earnings, second only to coffee [7]. The expansion and enhancement of the oilseeds sector can significantly contribute to national, regional, and family economic development. The Ethiopian government has recognised this fact, promoting the oilseeds sector by offering investment incentives such as duty and tax income exemptions for foreign investments ranging from 2 to 8 years [8]. Sesame is among the earliest oilseeds known to humans, having a broad range of distribution from the tropics to temperate areas. Sesame cultivation has a long

history in Ethiopia. According to some sources, sesame was introduced to Ethiopia from the west about 300 BC. Ever since then, Ethiopian farmers have grown sesame as a commercial crop. The crop's area coverage has been growing due to favourable agroecologies [9].

The Humera area in Tigray, the Pawi area of the Benishangul Gumuz region, the Chanka area in the Oromia region, and the Metemma and Wollo areas of the Amhara region are all major sesame producing parts of Ethiopia [10]. Sesame production is growing in Ethiopia's northwest and southwest regions due to high market demand and favourable environmental conditions [11]. In 2019/20, 543236 smallholder farmers produced 262,654 MT of sesame from 375120 hectares of land [10]. The increasing demand for sesame on the global market and the available capacity to enhance sesame production could promote Ethiopia's economic growth. However, sesame production and marketing in Ethiopia confront several obstacles to overcome. These major producing areas include low productivity and efficiency, inadequate market infrastructure, and long and conventional marketing channels. Sesame seed quality and export competitiveness have suffered due to insufficient road infrastructure, market knowledge, and warehouse facilities [12].

A study conducted by Aysheshm [13] and Gebremedhn et al. [14] identified the determinants of quantity of sesame supplied to the market in Metemma Woreda of the Amhara region and Humera district of the Tigray region of Ethiopia, respectively. However, no extensive previous studies investigated the determinants of the volume of sesame supplied in southwest Ethiopia's West Omo and Bench Sheko zones. Although the study area has remarkable potential for sesame production, productivity, and the benefits obtained from the crop, its production and productivity are not comparable to those in other parts of the country. As a result, the research aimed to determine the variables that affect the amount of sesame sold to the market by farmers in West Omo and Bench Sheko zones of southwest Ethiopia.

2. Materials and Methods

2.1. Description of the Study Area. This research was carried out in the former Bench Maji zone (West Omo and Bench Sheko zones) (Figure 1). The Ilemi Triangle borders it on the south, South Sudan on the west, Sheka on the north, the Gambella region on the northwest, Keffa on the northeast, and Debub Omo on the east. The Omo River forms much of the country's eastern border with Debub Omo. West Omo and Bench Sheko zones are among the twelve zones in the Southern Nations, Nationalities, and Peoples' Regional State of Ethiopia. Bench Sheko's administrative centre is Mizan Aman, approximately 584 km southwest of Addis Ababa. The Bench Sheko zone covers a total area of 19965.90 km^2.

It is found between latitude 5033′–7021′ and longitude 34088′–36014′, with a height of 500–2005 meters above the sea level. The zone is divided into six districts, with a total population of approximately 738886 people. The zone's agroecology comprises 52% lowlands, 43% midlands, and 5% highlands. The zone's average annual temperature varies between 15.1 and 27°C, and the average annual rainfall ranges between 400 and 2000 mm. Maize, godere (taro root), and enset are the main food crops in this zone, but sorghum, sesame, teff, wheat, and barley are also grown to some extent [15].

2.2. Sources and Methods of Data Collection. The data were gathered from both primary and secondary sources. Primary data were collected from sample farm families in seven rural Kebeles using a pretested semistructured questionnaire. Secondary data for the study were gathered from agriculture offices in each zone and district and published and unpublished reports.

2.3. Sample Size Determination and Sampling Technique. The multistage random sampling method was used in this research. Primarily, two districts from West Omo and Bench Sheko zones, Meinit Goldeya and Guraferda, were purposefully chosen based on the potential for sesame production, respectively; this information was received from the agricultural and rural development offices of the respective zones. Second, kebeles in each district were categorized into sesame producers and nonproducers. Third, seven sesame-producing kebeles from both districts were chosen randomly from among the sesame-producing kebeles. Finally, 270 sample sesame producer household heads were randomly chosen from 9210 sesame farmers in West Omo and Bench Sheko zones, using probability proportional to size sampling and the formula developed by Yamane [16] at the 95% confidence level with 5% degree of variability and 6% level of precision (Table 1).

$$n = \frac{N}{1 + N(e)^2} = \frac{9210}{1 + 9210(0.06)^2} = 270 \text{ households}, \quad (1)$$

where n is the sample size, N is the population size (sampling frame), and e is the level of precision.

2.4. Method of Data Analysis. Descriptive statistics consisting of frequency, mean, percentage, standard deviation, minimum, and maximum were used to describe the characteristics of sampled sesame producer households. When all households participate in the market, the OLS model is used to determine factors affecting the degree of participation. Not all households may be able to participate, and some may choose to participate in one market over another, while others may be excluded from the market. If the OLS regression is estimated without including nonparticipants, the model will suffer from sample selection bias [17]. Unfortunately, during the data collection time, all households become the suppliers of sesame products to the market. Therefore, the multiple linear regression model appropriately analysed the market supply. The model equation was specified as

$$Y_i = \beta_o + \beta_i X_i + \varepsilon_i, \quad (2)$$

where Y_i is the quantity of sesame supplied to the market (log-normalised), X_i is the explanatory variable that affects the dependent variable, and β_i is the estimation parameter.

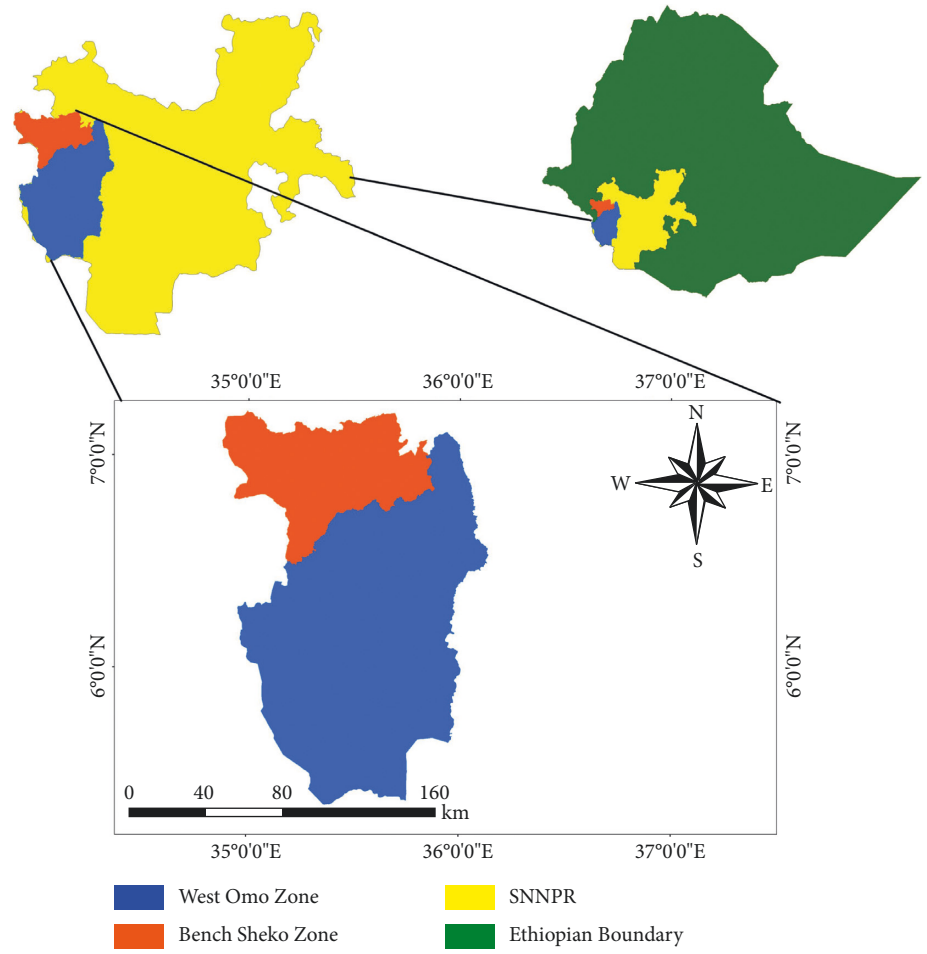

Figure 1: The study area's geographical location.

Table 1: A brief description of the sample frame and sample size.

Zones	Districts	Kebeles	Sesame producer HHs	Sample size	Percentage
Bench Sheko	Guraferda	Kuja	428	31	11.48
		Gabika	470	34	12.59
		Semerta	456	33	12.22
		Sega	401	29	10.74
West Omo	Meinit Goldeya	Kushanta	622	45	16.67
		Dega	670	47	17.41
		Genbab	705	51	18.89
	Total		3752	270	100

Source: own sampling design, 2018.

For the model parameters to be efficient, the CLR model's unbiased and consistent assumptions must be met. As a result, appropriate test statistics were used to perform multicollinearity, heteroscedasticity, model specification, and endogeneity detection tests. The result revealed that there is no problem with the model estimation.

2.5. Variables Definition and Working Hypotheses. Volume of sesame supplied: it is a continuous dependent variable measured in quintals (100 kg). It is the amount of sesame products delivered to the market by the farm household during the production period. To eliminate the effect of the outliers, the volume of sesame supplied was converted to the natural logarithm during analysis. Prior to determining the factors of the volume of sesame supplied to the market, potential independent variables that may determine the dependent variable (sesame market supply) were carefully chosen and hypothesized, as given in Table 2.

3. Results and Discussion

3.1. Characteristics of Sample Households. According to Table 3, the sample household heads' average family size was 5.48, with a minimum of 2.49 and a maximum of 12. This result is consistent with Shah et al.'s [18] result. This family

Table 2: Summary of variables definition, measurement, and working hypotheses.

Variables	Category	Measurement	Expected effect on supply
		Dependent variable	
Volume of sesame supply	Continuous	Natural log of the volume of supply in quintal (100 kg)	
		Independent variable	
Education level of the household head	Continuous	Years of schooling	+
Participation in training	Dummy	1 if yes and 0 otherwise	+
Sesame farming experience	Continuous	Years	+
Family size	Continuous	Number	±
Distance to the nearest market	Continuous	Kilometre	−
Land under sesame	Continuous	Hectare	+
Amount of credit received (log)	Continuous	Natural log of credit amount in ETB	+
Cooperative membership	Dummy	1 if yes and 0 otherwise	+
Annual nonfarm income (log)	Continuous	Natural log of nonfarm income	+
Frequency of extension contact	Continuous	Number of days	+
Sex of the household head	Dummy	1 if male and 0 otherwise	+
Total livestock unit	Continuous	Total livestock unit (TLU)	+

Table 3: Characteristics of sampled sesame producers.

Variable description	Mean	Std.	Minimum	Maximum
Family size	5.48	2.49	2	12
Sesame farming experience	7.07	3.76	3	22
Education level	2.48	2.10	0	9
Land under sesame	0.48	0.51	0.12	3
Extension contact (number)	2.78	2.57	14	1
Amount of credit (Ethiopian Birr)	2930.219	3341.735	12000	0
Distance to market (km)	5.89	4.16	2	22
Total livestock unit	5.72	4.19		
	Frequency		Percentage	
Access to training (trained HHs)	115		42.59	
Sex of household head				
Male	247		91.48	
Female	23		8.52	
Cooperative membership				
Yes	119		44.07	
No	151		55.93	

Source: own computation result, 2018.

size is large and above the national average household size of 4.7 [19]. The importance of larger families participating in agricultural production is emphasised, particularly when all household members participate in the production and provision of services to contribute to the family's economy [20]. In the study area, the farmers stayed in sesame farming for an average of 7.07 years. The education level of the sample respondents in terms of years of schooling ranged from 0 to 9 years, with a mean schooling of 2 years. This result reveals that, on average, farmers received the minimum required education level, sufficient for understanding agricultural instructions provided by extension workers. The outcome is consistent with Khan et al.'s [21] finding. The survey results indicate that in the 2018 production year, the maximum and average land cultivated by sesame was 3 and 0.48 hectares, respectively. The result implies that small-scale farmers cultivate sesame farming in the area. This result supports the findings of Osmani and Hossain [22], who reported that most of the farmers in Bangladesh are smallholders.

The extension service is currently focused on providing advisory services on major agronomic practices, postharvest handling, soil and water conservation practices, and playing a critical role in disseminating new and improved farming techniques. The case is similar in the study area. During the cropping season, the average frequency of extension contact was 2.78, with a standard deviation of 2.57. According to Ullah et al. [23], up-to-date information sharing among farmers on agricultural systems and marketing linkages has become more important. In terms of credit access, about 184 (68.15%) of sesame producing sample farmers reported obtaining credit, while the remaining 86 (31.85%) of sample households did not have access to credit. In credit service, farmers borrowed up to 2930.22 ETB on average from formal institutions (microfinance institutions and local cooperative unions) and informal sources (traders, relatives, and friends). Access to credit may boost sales, since farmers have utilized credit to finance improved technologies, resulting in increased agricultural productivity [24, 25].

In the study area, farmers obtain training from the farmer training centre and nongovernmental organizations. The training includes land preparation, fertilizers and seed application, sowing, weed management, and other

management practices. Out of the total respondents, about 115 (42.59%) reported receiving training during the survey period, while the remaining 155 (57.41%) did not. As per the survey's results, the average distance between a market and a household's residence is 5.89 km, ranging from 2 to 22 km. Of the total number of household heads interviewed, 247 (91.48%) and 23 (8.52%) were male and female-headed households, respectively. The result is in line with Apipoonyanon et al. [26] who showed that male-headed households dominate agricultural production in Thailand. According to the survey findings, 44.07% of the respondents were cooperative members, while the rest (55.93%) were not.

3.2. Determinants of Volume Supplied to the Market. The study of variables influencing sesame volume supply at the farm level was crucial in identifying issues limiting sesame supply to the market. The variables were identified using multiple linear regression models. The classical linear regression model assumptions should remain true for parameter estimations to be efficient. As a result, the predicted explanatory factors were evaluated using suitable test statistics for multicollinearity, heteroscedasticity, and endogeneity.

The multicollinearity test result indicates that there is no significant issue of multicollinearity among the explanatory factors, since the mean VIF was found 1.20. The Breusch–Pagan/Cook–Weisberg test result of heteroskedasticity revealed that there is no heteroskedasticity problem of the model. The omitted variable test is done by the Ramsey RESET test; since the null hypothesis was that there is no missed variable in the model, the null hypothesis was accepted, implying that the model is free of omitted variable bias.

Twelve explanatory variables were hypothesized to determine the volume of marketable supply of sesame. Among these variables, only eight variables, namely, total livestock unit, sesame farming experience, cooperative member, family size, land under sesame, off-farm income, training, and distance to the nearest market, were found significant (Table 4). The model's adjusted value is 0.64, which indicates that the proposed explanatory variables account for about 64% of the overall variation in sesame market supply. The summarised results of the model are given.

Total livestock unit: this variable affected the quantity of sesame supply positively and significantly. As a result, having more livestock aids in the procurement of agricultural inputs for cultivation, thus increasing sesame output and market supply indirectly. The result shows that a unit increase in the livestock causes a 22.1% increase in the amount of market, keeping all other factors unchanged. This result is consistent with the findings of Bezie [27] and Kebede et al. [28] who found that tropical livestock units positively and significantly influenced the amount provided to the market.

Sesame farming experience: as hypothesized, sesame farming experience positively contributed to the amount of sesame supplied to the market, and it was significant at a 1% level. Thus, the findings showed that as a farmer's experience rose by one year, the amount of sesame provided to the market improved by 1.6%, leaving other variables constant. This result implies that the more experienced farmers in sesame marketing and production have a greater capacity to supply more sesame products in the market compared to less experienced and less informed farmers, since they have better information and marketing networks. This result is consistent with the findings by [29–31] who indicated that as farmer' experience enhanced, the market supply of pineapple, coffee, and pepper increased, respectively. This result is inconsistent with Mariyono [32] who reported that experience in vegetable farming negatively affected commercialization because experienced farmers may have had poor experiences in commercial farming in the past, causing them to reduce the level of their farming operations.

Cooperative membership: at a 1% significance level, the study revealed a significant effect with an anticipated positive sign. The positive coefficient implies that the volume of sesame marketed for those households who are members of a cooperative increases by 21.2% compared to those households who are not cooperative members, keeping other factors constant. These findings may imply that households members of cooperatives obtain inputs like seeds, fertilizers, pesticides, insecticides, credits, and others that foster the farmer's production and influence. Furthermore, working in a group fosters collaboration among farmers allows them to obtain market information and share their experiences. Cooperatives in Thailand created social networks in the province to lower transaction costs, facilitate knowledge transfer, enable information flow, and exchange resources [33]. These findings agree with [34–36] who found that being a member of the farmers' association influenced the volume supplied to market positively and significantly. Mariyono et al. [25] agreed with the study that farmers who join cooperatives get a better price than those who do not.

Table 4: OLS estimation of determinants of quantity supply of sesame (log).

Variables	Coefficients	Std. error
Constant	−0.287	0.197
Sex	−0.101	0.067
Total livestock unit	0.221***	0.057
Sesame farming experience (years)	0.016***	0.006
Cooperative member	0.212***	0.050
Family size	−0.026**	0.013
Education	−0.013	0.010
Land under sesame (ha)	0.424***	0.053
Annual off-farm income (log)	0.023***	0.006
Amount of credit received (log)	0.004	0.005
Training participation	0.519***	0.058
Distance to nearest market (kms)	−0.006**	0.002
Frequency of extension contact	0.014	0.015
Number of observations	270	
F (12, 257)	41.20	
Prob > F	$P \leq 0.001$	
R-squared	0.6580	
Adj R-squared	0.6420	

Own computation result, 2018. *Note.* The dependent variable-is a log of the quantity of sesame supplied to the market. ***, **Significant at 1% and 5% significance levels, respectively.

Family size: it was hypothesized that this either negatively or positively affects the volume of sesame marketed. However, the model result confirmed, at a 5% significance level, that household family size had a negative impact on market supply. The negative effects of family size on market supply may imply that households with large family sizes allocate more quintals of products for consumption purposes and supply less to the market. The coefficient confirms that as the family size of the households increased by one, the market supply decreased by 2.6%. This result is in line with [37–39], which found a negative relationship between family size and market supply. Siziba et al. [40] also claimed that families having large family sizes could not generate a marketable surplus above their requirements of consumption.

Land under sesame: the study indicates that land designated for sesame has a substantial impact on the sales volume of sesame at a 1% significance level with an anticipated positive indication. The positive sign of land under sesame indicates that a one-hectare increase in the land allotted for sesame leads to an increase of 42.4% for sesame supply, holding all other factors unchanged. This finding supports the fact that the larger farmers concerning the area under cultivation are likely to be more interested in cash by selling their output in the market and less interested in keeping the produce at home for consumption. These results confirm the findings of Aslam et al. [41] and Anteneh [42], which indicated that the amount of land allotted for seed cotton and teff cultivation influenced the marketed supply of each commodity significantly and positively. These results confirm the findings of Jaji et al. [43], which indicated that the amount of land allotted for pineapple cultivation affected the marketed supply positively and significantly.

Annual off-farm income (log): as hypothesized, the off-farm income of the household heads had positively affected sesame market supply at 1% significance level. If a sesame producer obtains nonfarming income, on average, an increase of 1% causes 2.3% more sesame than those who did not have access while assuming all other variables are unchanged. This result may be attributed to the fact that farmers who received money from these sources utilized it to buy inputs for sesame cultivation, such as improved seeds, fertilizers, chemicals, and agricultural equipment, supplying more sesame to the market than those who did not. Herrera et al. [44] explained that having an off-farm income source positively impacted the productivity of smallholders in Brazil. This result is in line with Adenegan et al. [34] and Abajobir [45] who showed that access to nonfarm income had a positive and significant effect on the amount of maize provided to the market. Ola and Menapace [46] described the significance of having extra income sources in Africa's agricultural marketing.

Training participation: as anticipated, the provision of training services had a positive and significant effect on sesame market supply at a 1% significance level. The model result indicated that ceteris paribus, the amount of sesame supply for those households who participated in sesame production training, increased by 51.9% compared to those who have not participated. Farmers who obtain technical training can create greater production and supply because the instruction will boost their understanding. Mariano et al. [47] explained that most farmers in the Philippines have poor educational attainment, which affects their ability to use knowledge products and technology in rice cultivation. Hence, capacity-building initiatives are critical for developing farmers' technical and management skills. Mariyono et al. [25] stated that agricultural training empowers farmers with technical skills and practical knowledge. This outcome is consistent with Toma et al. [48] and Tegegne et al. [49] who confirmed that technical training services significantly influenced the volume of honey and milk market supply, respectively. Mariyono [32] also revealed that training in farming practices positively influenced vegetable supply.

Distance from the nearest market: at the 1% significance level, the coefficient of distance to market was negatively related to the sesame quantity supplied. The amount of sesame supplied decreased by 0.6% when the distance from home to the nearest market was increased by 1 km, while other variables remained constant. The implication is that farmers located at far kebeles have less access to other relevant factors like price information and transportation, which negatively affects the quantity supplied to the market. This result compromises the results of Gezachew [50] and Adepoju et al. [29] who reported that distance to market affects quantity supply significantly and negatively. Mariyono [32] also found that the closer the farmers are near vegetable markets, the more likely they would participate in commercial farming in Indonesia. This result is inconsistent with the findings of Wickramasinghe [51] in Tanzania who found a positive relationship between market supply and distance to markets.

4. Conclusions

The result of multiple linear regression analysis shows eight variables: total livestock unit, sesame farming experience, cooperative membership, family size, land under sesame, annual off/nonfarm income, participation in training, and distance to the nearest market affecting the market supply of sesame. The variables total livestock unit, sesame farming experience, cooperative membership, land under sesame, annual off-farm income, and participation in training affected positively and significantly the market supply of sesame. However, distance to the nearest market and family size affected the market supply of sesame negatively and significantly.

Based on the findings, policymakers should focus on strengthening sesame producer cooperatives, promoting experience sharing among experienced farmers, improving transportation accessibility and infrastructure development, improving productivity through strengthening extension service providers, and encouraging sesame producers to participate actively in various training. As a result, those mentioned above key socioeconomic and institutional variables must be considered to enhance the market supply of sesame in the study area.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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References

[1] N. T. Phuong and N. Van Duong, "Market and Economic Analysis of Sesame Production in South-Central Coastal Vietnam," *Sustainable and Profitable Crop and Livestock Systems in South-Central Coastal Vietnam*, ACIAR, Canberra, ACT, Australia, 2015.

[2] L. Orsi, I. De Noni, S. Corsi, and L. V. Marchisio, "The role of collective action in leveraging farmers' performances: lessons from sesame seed farmers' collaboration in eastern Chad," *Journal of Rural Studies*, vol. 51, pp. 93–104, 2017.

[3] D. Myint, S. A. Gilani, M. Kawase, and K. N. Watanabe, "Sustainable sesame (Sesamum indicum L.) production through improved technology: an overview of production, challenges, and opportunities in Myanmar," *Sustainability*, vol. 12, no. 9, p. 3515, 2020.

[4] FAO, "Detailed trade matrix," 2019, http://www.fao.org/faostat/en/#data/TM.

[5] Mordor Intelligence, "Global sesame seeds market-segmented by geography-growth, trends, and forecast," 2019, https://www.mordorintelligence.com/industry-reports/sesame-seeds-market.

[6] Faostat, "Food and agriculture of the united nation statistical database," 2020, https://www.fao.org/faostat/en.

[7] USDA, *Ethiopia Oilseeds Report Annual, Assessments of Commodity and Trade Issues*, USDA, Washington, DC, USA, 2020.

[8] J. H. Wijnands, J. Biersteker, and V. L. En, *Oilseeds Business Opportunities in Ethiopia, Public Private Partnership on Oil (PPPO)*, Ministry of Agriculture, Nature and Food Quality, Hage, Netherlands, 2009.

[9] MOA (Ministry of Agriculture), *Sesame Value Chain Development Strategy (Working Document 2015-2019)*, MOA, Addis Ababa, Ethiopia, 2015.

[10] CSA (Central Statistical Agency), *Statistical Report on Area and Production of Major Crops (Private Peasant Holdings, Meher Season)*, CSA, Addis Ababa, Ethiopia, 2020.

[11] J. H. Wijnands, J. Biersteker, and R. Hiel, *Oilseeds Business Opportunities in Ethiopia*, Ministry of Agriculture, Nature and food quality, Hage, Netherlands, 2007.

[12] T. Negasa, "Review of sesame value chain in Ethiopia," *International Journal of African and Asian Studies*, vol. 19, pp. 36–47, 2016.

[13] K. Aysheshm, *Sesame Market Chain Analysis: The Case of Metema Woreda, North Gondar Zone, Amhara National Regional State*, MSc Thesis, Haramaya University, Haramaya, Ethiopia, 2007.

[14] M. B. Gebremedhn, W. Tessema, G. G. Gebre, K. T. Mawcha, and M. K. Assefa, "Value chain analysis of sesame (Sesamum indicum L.) in Humera district, Tigray, Ethiopia," *Cogent Food & Agriculture*.vol. 5, no. 1, pp. 1–11, 2019.

[15] CSA (Central Statistical Agency), *Population Projection of Ethiopia for All Regions at Wereda Level from 2014-2017*, CSA, Addis Ababa, Ethiopia, 2013.

[16] T. Yamane, *Statistics: An Introductory Analysis*, Harper and Row, New York, NY, USA, 2nd edition, 1967.

[17] D. N. Gujarati, *Basic Econometrics*, McGraw-Hill, New York, NY, USA, 4th edition, 2003.

[18] S. A. Shah, S. Ali, A. Ali, and A. Baig, "Economic analysis of maize production in central khyber pakhtunkhwa, Pakistan," *Sarhad Journal of Agriculture*, vol. 36, no. 3, 2020.

[19] EPHI (Ethiopian Public Health Institute [Ethiopia] and ICF, *Ethiopia Mini Demographic and Health Survey 2019: Final Report*, EPHI and ICF, Rockville, MD, USA, 2021.

[20] B. Msongaleli, S. Tumbo, F. Rwehumbiza, and N. Kihupi, "Determinants of farm-level decisions regarding cereal crops and varieties in semi-arid central Tanzania," *African Journal of Agricultural Research*, vol. 10, no. 30, pp. 2968–2978, 2015.

[21] S. Khan, I. Ullah, and S. A. Murtaza, "Profitability and determinants of potato growers in district Swat of Khyber Pakhtunkhwa, Pakistan," *Sarhad Journal of Agriculture*, vol. 36, no. 3, pp. 748–753, 2020.

[22] A. G. Osmani and E. Hossain, "Market participation decision of smallholder farmers and its determinants in Bangladesh," *Economics of Agriculture*, vol. 62, no. 1, pp. 163–179, 2015.

[23] A. Ullah, M. Arshad, H. Kächele, A. Khan, N. Mahmood, and K. Müller, "Information asymmetry, input markets, adoption of innovations and agricultural land use in Khyber Pakhtunkhwa, Pakistan," *Land Use Policy*, vol. 90, Article ID 104261, 2020.

[24] J. Mariyono, J. Waskito, M. F. Nurwildani, and A. Kuntariningsih, "Role of microcredit and technology adoption in sustaining farmers' welfare," *Journal of Rural Development*, vol. 38, no. 1, pp. 102–122, 2019.

[25] J. Mariyono, J. Waskito, A. Kuntariningsih, G. Gunistiyo, and S. Sumarno, "Distribution channels of vegetable industry in Indonesia: impact on business performance," *International Journal of Productivity and Performance Management*, vol. 69, no. 5, pp. 963–987, 2020.

[26] C. Apipoonyanon, S. Szabo, T. W. Tsusaka, K. Leeson, E. Gunawan, and J. K. Kuwornu, "Socio-economic and environmental barriers to increased agricultural production: new evidence from central Thailand," *Outlook on Agriculture*, vol. 50, no. 2, pp. 178–187, 2021.

[27] S. Bezie, *Dairy Value Chain Analysis in Meta District, Eastern Ethiopia*, MSc Thesis, Haramaya University, Haramaya, Ethiopia, 2016.

[28] A. L. Kebede, A. Dinku, and M. Sheko, "Value chain analysis of smallholder milk producer in West Hararghe Zone, Ethiopia," *International Journal of Agricultural Science and Food Technology*, vol. 6, no. 2, pp. 93–100, 2020.

[29] A. O. Adepoju, I. T. Owoeye, and I. B. Adeoye, "Determinants of market participation among Pineapple farmers in Aiyedaade local government area, Osun State, Nigeria," *International Journal of Fruit Science*, vol. 15, no. 4, pp. 392–404, 2015.

[30] B. A. Gashaw, D. G. Habteyesus, and Z. S. Nedjo, "Analysis of marketed surplus of coffee by smallholder farmers in Jimma zone, Ethiopia," in *Proceedings of the Ethiopian Coffee Science Society (ECSS) Inaugural Conference Held on 7-8 April 2017*, Jimma, Ethiopia, 2019.

[31] G. Wosene, M. Ketema, and A. Ademe, "Determinants of pepper market supply among small holder farmer in

wenberma district, west gojjam zone of Amhara region, Ethiopia," *Agriculture, Forestry and Fisheries*, vol. 7, no. 6, pp. 133–142, 2019.

[32] J. Mariyono, "Stepping up to market participation of smallholder agriculture in rural areas of Indonesia," *Agricultural Finance Review*, vol. 79, no. 2, pp. 255–270, 2019.

[33] W. Petcho, S. Szabo, K. Kusakabe, and V. Yukongdi, "Farmers' perception and drivers of membership in rice production community enterprises: evidence from the central region, Thailand," *Sustainability*, vol. 11, no. 19, p. 5445, 2019.

[34] K. O. Adenegan, A. Adepoju, and L. O. Nwauwa, "Determinants of market participation of maise farmers in rural Osun State of Nigeria," *International Journal of Agricultural Economics & Rural Development*, vol. 5, no. 1, pp. 28–39, 2012.

[35] N. N. Kyaw, S. Ahn, and S. H. Lee, "Analysis of the factors influencing market participation among smallholder rice farmers in magway region, central dry zone of Myanmar," *Sustainability*, vol. 10, pp. 1–15, 2018.

[36] C. Sebatta, J. Mugisha, E. Katungi, A. Kashaaru, and H. Kyomugisha, "Smallholder farmers' decision and level of participation in the potato market in Uganda," *Modern Economy*, vol. 05, no. 08, pp. 895–906, 2014.

[37] H. Asfaw, *Durum Wheat Value Chain Analysis: The Case of Gololcha District of Bale Zone, Ethiopia*, MSc Thesis, Haramaya University, Haramaya, Ethiopia, 2014.

[38] A. Workye, D. Goshu, and B. Tegegne, "Analysis of factors influencing market supply of rice by smallholder farmers in Guraferda district, southwest Ethiopia," *Agriculture, Forestry and Fisheries*, vol. 8, no. 5, pp. 95–99, 2019.

[39] V. P. Sharma, "Marketable and marketed surplus of rice and wheat in India: distribution and determinants," *Indian Journal of Agricultural Economics*, vol. 71, no. 2, pp. 137–159, 2016.

[40] S. Siziba, K. Nyikahadzoi, A. Diagne, A. O. Fatunbi, and A. A. Adekunle, "Determinants of cereal market participation by sub-Saharan Africa smallholder farmer," *Journal of Agriculture and Environment Studies*, vol. 2, no. 1, pp. 180–193, 2011.

[41] M. Aslam, A. Ghafoor, M. Abbas, and S. Rasool, "Determinants of marketed surplus-a case of seed cotton growers in District Khanewal," *Journal of Agricultural Research*, vol. 51, no. 1, pp. 71–79, 2013.

[42] A. Anteneh, *Analysis of Teff (Eragrostistef) Market Chain: The Case of HuletEjEnese District, East Gojam Zone, Amhara Region, Ethiopia*, MSc Thesis, Haramaya University, Haramaya, Ethiopia, 2017.

[43] K. Jaji, N. Man, and N. M. Nawi, "Factors affecting pineapple market supply in Johor, Malaysia," *International Food Research Journal*, vol. 25, no. 1, pp. 366–375, 2018.

[44] G. P. Herrera, R. Lourival, R. B. Da Costa et al., "Econometric analysis of income, productivity and diversification among smallholders in Brazil," *Land Use Policy*, vol. 76, pp. 455–459, 2018.

[45] N. Abajobir, "Analysis of maize value chain: the case of guduru Woreda, horro guduru wollega zone of oromia regional state, Ethiopia," *International Journal of Agriculture & Agribusiness*, vol. 3, no. 2, pp. 257–291, 2019.

[46] O. Ola and L. Menapace, "A meta-analysis understanding smallholder entry into high-value markets," *World Development*, vol. 135, Article ID 105079, 2020.

[47] M. J. Mariano, R. Villano, and E. Fleming, "Factors influencing farmers' adoption of modern rice technologies and good management practices in the Philippines," *Agricultural Systems*, vol. 110, pp. 41–53, 2012.

[48] T. Toma, B. Tegegn, and L. Zemedu, "Determinants of honey market supply: the case of shebedino district, sidama zone, SNNPR, Ethiopia," *Journal of Economics and Sustainable Development*, vol. 8, no. 19, pp. 7–10, 2017.

[49] A. Tegegne, Z. Shumeta, and Z. Mekuriaw, "Factors affecting milk market supply and level of supply by smallholder milk producers: the case of dessie zuria district, south Wollo zone, Ethiopia," *Journal of Marketing and Consumer Research*, vol. 34, pp. 5–15, 2017.

[50] F. Gezachew, "Factors affecting marketing intensity of wheat growers in southeastern Ethiopia," *Journal of Agricultural Science and Food Research*, vol. 9, no. 1, pp. 1–6, 2018.

[51] U. Wickramasinghe, "Production specialization and market participation of smallholder agricultural households in developing countries," *Sustainable Economic Development*, Academic Press, Cambridge, MA, USA, pp. 349–367, 2015.