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Determinants of Sesame Market Supply in Melokoza District, Southern Ethiopia

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Abstract
Sesame is an important cash crop and plays vital role in the livelihood of many people in Ethiopia. However a number of challenges hampered the development of sesame sector along the market. Therefore this study was initiated to analyze the determinants of sesame market supply by farm household in the study area. Both primary and secondary data were used for the study. Primary data were collected from 123 farm households selected randomly through semi structured questionnaire. Secondary data were collected by reviewing documents from different sources. Econometric model were used to analyze the data. The result of the multiple linear regression model indicated that seven variables namely Land allocated under sesame, sesame yield, family size, extension contact, credit access and market information influenced market supply of sesame positively while distance to the nearest market center was found to have a significant negative effect on sesame market supply. The finding suggests that, Strengthening Institutions that convey reliable and timely market information; strengthening extension system through training in all aspect and design financial institutions to address the challenges of financial access to smallholder farmers and traders. Moreover, government and concerned stakeholders need to give attention to infrastructural and yield increasing technologies in the study area to boost production and thereby increase market supply of sesame.
Keywords: Sesame; Melokoza; Households ;Market supply; Multiple Linear Regression

1. INTRODUCTION

Oilseeds play a significant role on the lives of Ethiopian agrarian community and stakeholders in the national economy of Ethiopia. A variety of oilseeds are grown in Ethiopia, of which sesame is by far the most important both in terms of volume, value and export earnings [1]. According to [2] promotion of export potential cash crop is crucial since it generates income for the producers as well as government for acquiring foreign currency. Ethiopia has a long history of sesame cultivation which has been expanding in its area coverage due to the presence of suitable agro-ecologies for the crop as well as the rise of profitability of the crop [3].

According to [4] from an area of 337,926.82 hectares produce 2,678,665.46 quintals with the yield of 7.93 quintals/ha. In Melokoza District, most farmers are involved in sesame production as the main source of income. According to Melokoza District Agriculture and Natural Resource Office, in 2016/17 GC, 10,085 hectares were covered by sesame with average productivity of 6.9Qt /ha.

Various studies were undertaken regarding sesame production and marketing in Ethiopia so far by different authors ([2]; [5]; [6]; [7] and [8]. However, those studies do not provide empirical evidence that can be directly used for improving production and marketing of sesame in the study area. Determinants of Sesame Market supply taking into consideration of product and location specificity is useful intervention to identify bottlenecks and come up with possible solution. This study therefore, attempted to analyze the determinants of sesame market supply by farm household in Melokoza district.

2. RESEARCH METHODOLOGY

2.1. Study Area

This study was conducted in Melokoza district, one of the districts in the Southern Nations, Nationalities and Peoples Regional State of Ethiopia located at $6^0$30'0"N Latitude and $36^0$40' 0"E. It is part of the Gamo Gofa Zone, which is located at 347km from Arba Minch (zonal city), 396 km from Hawassa and 661 km from Addis Ababa that bordered on the south by Basketo Special district, on the southwest by the Debub (South) Omo Zone, on the north by Dawro Zone, on the northwest by the Konta Special Woreda, and on the east by Demba Gofa and Geze Gofa districts.The mean annual rainfall of the district is 1125mm and Mean temperature of the district is 21.3c^0. Soil types of the district are 50% clay loam, 35% sandy loam and the remaining 15% clay soil. Agriculture is the major subsistence activity on which the largest proportion of the population directly depends for its livelihoods. The district has two agricultural production seasons that are belg for sesame, haricot bean and maize production and meher for production different crops except sesame [9].

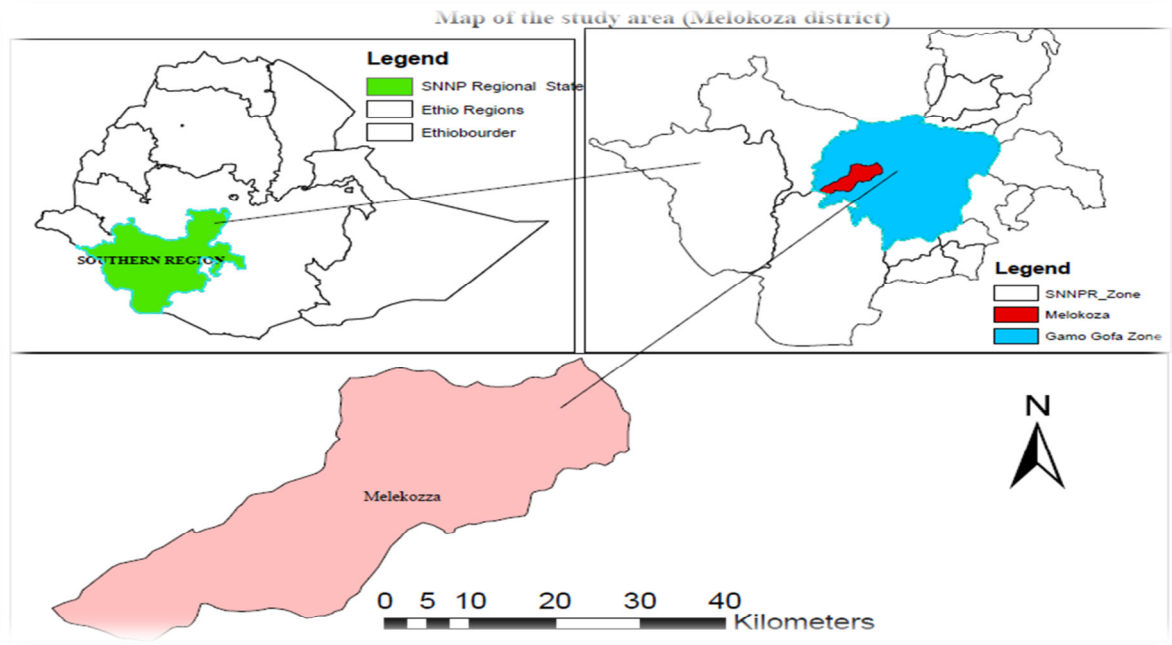

Figure 1 : Location of the study area
Source: Developed from Ethio-GIS

2.2. Data Type, Sources and Method of Collection

In the study primary and secondary data sources were used to capture both qualitative and quantitative data type. Primary data were collected from Sesame producer farmers and other concerned bodies by using interview schedule and structured questionnaire. Secondary data were also be collected from government institutions, District Agricultural Natural Resource Office, Zone and district marketing office, reports, published and unpublished documents. Enumerators, who have acquaintance with local language and culture of the local people were selected, trained and employed for data collection.

2.3. Sampling Procedures and Sample Size

Two - stage sampling procedure was employed to select sample farm households. First, four kebeles were selected randomly from sesame producing kebeles of the district. Second, 123 representative sample respondents were randomly selected from sampled kebeles, using probability proportional to size sampling technique. The determination of sample size was resolved by sampling formula [10].
The formula is:

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

Where,
n= sample size for the research use;
N= total number of sesame producer households; N=17,881
e = margin of error, for this study 9% was used to obtain manageable sample size.

2.4. Methods of Data Analysis

Econometric model was used for analyzing data that was obtained from the survey. All the sampled sesame producers of the study area supply sesame to the market. Hence, the dependent variable is the amount of sesame supplied to the market which is a continuous variable. So that multiple linear regression model was fitted for survey data to identify determinants of sesame supply to the market. Following [11], econometric model specification of the multiple linear regression models in matrix notation is:

$Y_i = X_i\beta + \epsilon_i$

Where: Y_i = quantity of sesame supplied to market
β= Coefficient of i^{th} explanatory variables
X_i = Vector of explanatory variables
ϵ_i= disturbance term

2.5. Hypothesis and Variables Definition

In the case of identifying factors influencing sesame supply to the market at farm household level, the main task was exploring which factors potentially influence and how these factors are related with the dependent variables. Therefore, the following dependent and independent variables were hypothesized.

Quantity of sesame supplied to market: it is continuous dependent variable used in multiple linear regression model equation. It is measured in quintal (100kg) and represents actual sesame supplied to the market by farm household in production year.

Table 1.*Description of explanatory variables and hypothesis*

Explanation	Variable type	Measurement	Hypothesis
Sesame yield	continuous	Quintals per hectares	+ve
Land allocated under sesame	continuous	hectares	+ve
Credit access	dummy	1 if credit access,0 otherwise	+ve
Access to market information	dummy	1 if information access,0 otherwise	+ve
Education level of HHH	continuous	Year of schooling	+ve
Family size	continuous	Man equivalent	+ve
Number of extension contact	continuous	Frequency extension contact	+ve
Distance to the market	continuous	Kilo meters	-ve
Membership in cooperatives	dummy	1 if member,0 otherwise	+ve
Off /non-farm income	continuous	Birr	+ve
Experiences	continuous	Number of years	+ve
Sex of the HHH	dummy	1, if male , 0 otherwise	+ve
Livestock ownership	continuous	Number of livestock	+/-ve

3. RESULTS AND DISCUSSION

Determinants of Quantity of Sesame Supplied to Market

According to the result all sample households supply sesame to the market during the survey period. Some variables were hypothesized to determine sesame market supply by sampled sesame producer farmers. All hypothesized explanatory variables were checked for the existence of multi-collinearity, omitted variable and heteroscedasticity.

Test of multicollinearity: this study used variance inflation factors (VIF) to investigate the degree of multicollinearity among variables. The results of all VIF values were ranging between 1.27 and 7.89 with mean value of 2.97. This indicates absence of serious multicollinearity problem among independent variables.

Omitted variable test: the problem of omitted variable was tested using Ramsey RESET test. Since the p-value for this test is 0.31 which implies, there is no omitted variable problem in the model.

Heteroscedasticity test: heteroscedasticity was tested using Breusch-pagan test. The result for p-value was 0.1354 hence; there was no serious problem of heteroscedasticity in the model. Hence, all the explanatory variables hypothesized were included in the model for analyzing determinants of market supply of sesame. The overall goodness of fit represented by model count R^2 is very good and adjusted R^2 value is 0.9765. This result indicates that about 97.65% of the variation in farm level market supply of sesame was attributed to the hypothesized variables.

Thirteen explanatory variables were hypothesized to determine household level sesame supply to the market. Among those variables seven variables namely Land allocated under sesame, sesame yield, family size, extension contact, credit access and market information influenced market supply of sesame positively while distance to the nearest market center was found to have a significant negative effect on sesame market supply (Table 2).

Land allocated for sesame: It was positively and significantly affected sesame supply at 1% significance level, as expected. An increase in the size of one hectare of land allocated under sesame resulted in an increase in farm level market supply of sesame by 6.80 quintals, keeping other factors constant. Similarly [5], [12] and [13] indicated that the area of land allocated had significantly and positively affected farm level market supply.

Sesame yield: Measured in quintals per hectare. Yield of sesame affected market supply significantly and positively as expected at 1% significance level. Since this variable is a proxy variable for amount of sesame produced by households, it indicates that households with high level of yield had also supplied more to the market than those who had low yield of sesame. An increase in Sesame yield by one quintal resulted in an increase in farm level market supply of sesame by 1.96 quintals, keeping other factors constant. Previous studies, such as [2], [14] and [15] found that yield affected market supply significantly and positively.

Family size: family size affected farm level sesame supply positively and significantly at 5% level of significance. It was measured in man-equivalent that is the avaliavlity of active labor force in household affects the supply of sesame to the market. As family size increases by one man-equivalent, the quantity of sesame

supplied to market increases by 0.15 quintals. This might be due to labor intensive nature of the crop at the time of weeding and harvesting, that requires high labor and in these rural areas there was no market for labor. Thus, family labor was the main source of labor force in such cases. [2] and [16] also indicated the number of active family labor affected market supply positively respectively.

Number of extension contact: number of extension contact affected positively and significantly market supply of sesame as expected at 1 % significance level. If sesame producer farmer's number of contact to extension agent increased by one the amount of sesame supplied to market increase by 0.83 quintals. This suggests that access to extension service avails information regarding technology which improves production that affects the market supply of sesame at farm household level. Studies by [13] and [15] indicated that extension contact was positively and significantly related to market supply.

Access to credit: This variable affected the amount of sesame sold significantly and positively at 5% level of significance. It was hypothesized that if household have access to credit service, they can have sufficient finance to pay for seasonal labor and to buy modern inputs, thereby increasing production which is reflected in the market supply of sesame. As compared to non credit users, those who get credit access, increase in amount of sesame sold by 0.66 %. It is aligned with [17] and [18].

Access to market information: access to market information is positively and significantly affected market supply of sesame at 5% significance level. The positive sign indicated that as farmers have accesses to market information, the quantity of sesame supplied to market increases. The coefficient confirmed that accessing market information to farmers increase market supply of sesame by 0.093 quintals. Previous studies such as [13], [14], [19] and [20] indicated that access to market information affect market supply positively.

Distance to the nearest market: It was argued that distant markets increase producers marketing cost which intern reduce the volume of output supplied to the market. The result obtained from the model output indicates that distance from the nearest market negatively and significantly influenced market supply of sesame at 10% significance level. An increase in distance from nearest sesame market by a unit kilometer decreases quantity of sesame supplied to the market by 0.24 quintal keeping other factors constant. It is in line with [20], [21] and [22] identified that distance from the nearest market has significant negative effect on the quantity of coffee, fruit and haricot bean marketed.

Table 2.*OLS results of determinants of sesame market supply*

Variables	Coefficient	Standard error	t-ratio
Sex of the household head	0.44	0.524	0.84
Experiences in sesame production	0.033	0.069	0.48
Sesame yield	1.96	0.167	11.72***
Family size	0.15	0.065	2.29**
Land allocated for sesame	6.80	0.20	34.00***
Education level of HHH	0.07	0.137	0.51
Access to credit	0.66	0.286	2.31**
Number of extension contact	0.83	0.269	3.08***
Livestock ownership	0.073	0.143	0.51
Access to market information	0.093	0.046	2.03**
Membership in cooperatives	0.25	0.178	1.40
Distance to the nearest market	-0.24	0.133	-1.80*
Off /non-farming income	0.20	0.157	1.27
Constant	-15.08	1.153	-13.08***

Dependent variable =quantity of sesame supplied to the market, N=123, R^2=0.9792 Adj. R^2=0.9765 ***, **, and * show the value statistically significant at 1%, 5% and 10% respectively.
Source: Survey result, 2017

4. CONCLUSION AND RECOMMENDATIONS

Multiple linear regression model was used to estimate determinants of market supply of sesame in the study area with the help of thirteen hypothesized explanatory variables. Out of those variables seven variables namely land allocated under sesame, sesame yield, family size, number of extension contact, credit access and market information influenced market supply of sesame positively while distance to the nearest market center was found to have a significant negative effect on sesame market supply. It is recommended that:

i. Develop better land management practices and area which is not under cultivation must be put in production of sesame.
ii. Increase yield of sesame through providing modern inputs at the right time, the required amount and reasonable price.
iii. Creating institution that can disseminate reliable and timely market information is required by all stakeholders simultaneously to operate market efficiently and harmoniously.

iv. Creating conducive environment for seasonal labor recruitment and labor mobilization from the highlands when needed by providing labor recruitment.
v. assign efficient extension system, updating the extension agent's knowledge and skills with improved production and marketing system
vi. Improve credit system through strengthening institutions and way of giving services.

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