

# Determinants of Faba bean Sales Volume in Chelia District, West Shoa Zone, Oromia National Regional State, Ethiopia

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## Abstract

Faba bean is an important pulse crop which plays a vital role in the livelihood of many people in Ethiopia. Despite the actual production and the socio-economic importance of the crop, enhancing faba bean producers to reach markets is not well addressed in the study area. Therefore, this study was initiated to analyze the determinants of Faba bean market supply by farm household in Cheliya District, West Shoa Zone. Both primary and secondary data were used for the study. Primary data were collected from a sample of 132 faba bean producers, and 32 traders using random sampling, and purposive sampling method, respectively. Secondary data were collected through reviewing documents from different sources. Descriptive statistics and econometric model were used to analyze the data. The result of Multiple Linear Regression Model revealed that four variables namely education level of the household head, number of livestock owned, farming experience on faba bean production, and distance to the nearest market influenced the sales volume of Faba bean positively while income from non-farm activities had negatively and significantly influenced the sales volume of faba bean. The findings suggests that, strengthening the provision of education, improving producers knowledge and experience on faba bean production, expanding accessibility of market infrastructure, and enhancing crop-livestock production was suggested in the study area to boost production and thereby increase the sales volume of Faba bean.

**Keywords:** Faba bean, Cheliya, Sales volume, Multiple Linear Regression Model

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## 1. INTRODUCTION

Pulse crops are important components of crop production in Ethiopia's smallholder agriculture, providing socio-economic advantage to smallholder farmers as an alternative source of protein and other nutrients, cash income that seeks to address food security (Alemneh *et al.*, 2016). Recently, the production and supply of pulses, increased due to increased demand in both local and international markets, thus enhancing smallholders' income (Chilot *et al.*, 2010).

Faba bean (*Vicia faba L.*) is among the most important pulse crop in the highlands and mid-highlands of Ethiopia. It was the first crop among the pulses grown in the country both in terms of area coverage and volume of annual production (Jensen, *et al.*, 2010). Currently, it occupies about 427,696.80 hectares of land with an annual national production of 8, 780,108.79 quintals with an average yield of 20.53 quintals per hectares in the country (CSA, 2017).

Chelia district, where the study focused, is endowed with suitable diverse natural resource, has the capacity to grow different annual and perennial crops like faba bean and field pea. Most farmers in the area produce faba bean for home consumption, in the form of green pods, *shiro* and as boiled grain. Still, most of the produce sold to the market, after deducting the seed needed for the next cropping season and grains needed for home consumption. As such, faba bean plays an important role for generating cash income in the area. According to Chelia District Office of Agriculture in 2017 production season, the district produced 22,460 quintals of faba bean at the rate of 18.4qts/ ha from 1061 hectare of land (Chelia District Agriculture Office, 2018).

With respect to households' market supply of faba bean, smallholders' market surplus of faba bean is in small quantities of varying quality and farmers are not well integrated to the market. The small quantity of the commodity produced and sold coupled with high transportation and transaction costs incurred in the commodity trading reinforce the subsistence orientation of the smallholder farmers. Moreover, much of the pulse production in Ethiopia is also consumed on-farm, and only the remainder is marketed, demonstrating that smallholder farmers primarily produce for subsistence needs, and this income benefit may not be realized (Gebremedhin and Hoekstra, 2008).

The previous studies conducted on faba bean in Ethiopia have mainly focused on production, field pests and diseases to establish the status and distribution of the diseases and insect pests for exploring control measures (Sahile *et al.*, 2008). In addition, value chain analysis of faba bean conducted by Beza (2014) in Bako Tibe and Gobu Seyou districts identified different constraints and opportunities of all actors in faba bean value chain. However, those studies do not provide empirical evidence that can be directly used for improving production and marketing of Faba bean in the study area. This study therefore, attempted to analyze the determinants of Faba bean sales volume by smallholder faba bean producers in Cheliya District.

## 2. RESEARCH METHODOLOGY

### 2.1 Description of the Study Area

The study was conducted in Cheliya District, West Shewa Zone, Oromia National Regional State. The capital of the District, Gedo Town located 175km to West of Addis Ababa on the main road to Nekemte. The District has 20 *Kebeles* of which 18 are rural and two urban. The boundaries of the District adjoin Mida Kegn District in the north, Jibat and Dano District in the south, Liban Jawi District in the east and Ilu Gelan and Jimma Rare District in the west. The total population of the District was estimated to be 104,448 of which 52,481 were males and 51,967 were females, respectively. Among these, 89,523 live in rural areas while the rest 14,925 live in urban areas (Chelia District Agricultural Office, 2018).

The climate of the District is in general 61.7% midland and 38.3% highland. The average annual rainfall of the District ranges from 1000 to 1400 mm per year and the altitude ranges from 1800 to 3050 meter above sea level. The District has the temperature ranging from 17°C to 21°C. Crop production and livestock rearing were the main economic activities in the area. The major food crops grown by farmers were different pulse crops like faba bean and field pea, and cereal and horticultural crops which include *teff*, wheat, barley, potato, cabbage, onion, garlic, apple, beet root, carrot, shallot are the major crops grown in the area. Farmers keep a significant number of livestock (cattle, sheep, donkey and horse) for various purposes in the area. The District has favorable climatic and soil conditions for faba bean production and other crops (Chelia District Agriculture Office, 2018).

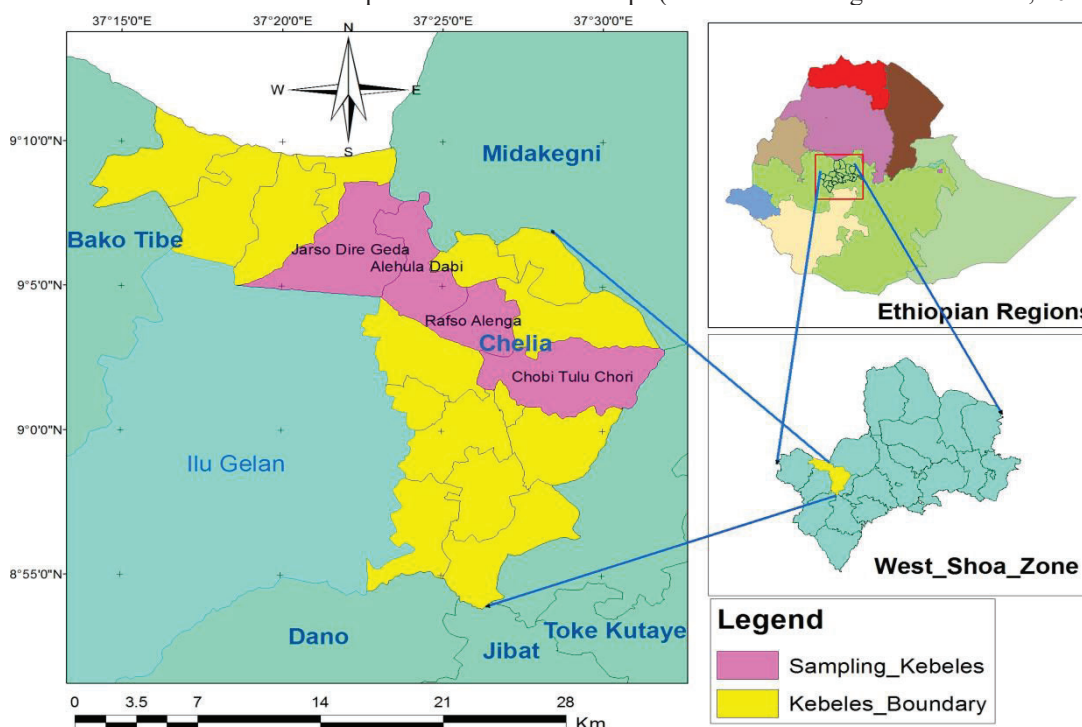


Figure 1: Location map of the study Area  
Source: Adopted from ArcGIS computation and Ethiopian map (2018)

### 2.2 Types, Sources and Methods of Data Collection

This study was conducted based on cross-sectional data obtained from both primary and secondary sources. Primary data were collected through face-to-face personal interviews using structured questionnaire from sampled households and the other from faba bean traders. Focus group discussion and key informants' interview were also conducted to collect additional supporting information for the study. The KIIs was conducted with the model farmers, Agricultural Office experts of the District, and Development Agents to get relevant information for the study. A total of four focus group discussions involving 8-10 members in each group were held in selected *kebeles* to collect the relevant data for the study. Secondary data were collected from District Office of Agriculture, District Trade and Market Development Office and its associated primary cooperatives, different published and unpublished materials.

### 2.3 Sampling Technique and Sample size Determination

Two-stage sampling technique was employed to select sample farm households. In the first stage, four *kebeles* namely Rafso Alenga, Chobi Tulu Chori, Alleula Dhabi, and Jarso Dire Geda were selected randomly from a total of 18 faba bean producing *kebeles* of the district. In the second stage, from the total of 834 faba bean

producing households in the selected four *kebeles*, 132 sample household head were selected randomly, using probability proportionate to size of faba bean producer households in the *kebeles*. The sample size was determined based on the formula given by Yamane (1967) at 95% confidence level with degree of variability 5% and level of precision equal to 8%:

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

$$n = \frac{834}{1+834(0.08)^2} \approx 132$$

Where, n is the sample size, N is the total size of the faba bean producers in selected *kebeles* (834), and e is margin of error (8%).

Table 1: Distribution of sample households in selected *Kebeles*

Name of <i>Kebeles</i>	Faba bean producer HHs	Percentage to each <i>Kebele</i>	Sample households
Refsa Alenga	305	36.57	48
Chobi Tulu Chori	160	19.19	25
Alle Ula Dhaba	189	22.66	30
Jarso Dire Geda	180	21.58	29
Total	834	100	132

Source: District Agricultural Office and *Kebele* administration, 2018

#### 2.4 Methods of Data Analysis

Multiple linear regression model was used to analyze the factors affecting faba bean sales volume in the study area. This model was selected for the reason that, all the sampled Faba bean producers of the study area supply Faba bean to the market. Hence, the dependent variable is the amount of faba bean supplied to the market which is a continuous variable.

Following Green (2003), the multiple regression model was specified as;

$$Y = X'\beta + U \dots\dots\dots (2)$$

Where: Y = quantity of faba bean supplied to market

$X'$  = Vectors of explanatory variables

$\beta$  = a vector of parameters to be estimated

$U$  = the error term

#### 2.5 Hypothesis and Variables Definition

##### *Dependent variable*

**Amount of faba bean supplied to the market (QTSOLD):** It is a continuous dependent variable used in multiple linear regression model analysis. It was measured in quintal and represents the quantity sold of faba bean by sampled households to the market in the survey period.

Table 2: Hypothesized explanatory variables in multiple regressions Model

Variables	Description	Variable type	Measurement	Expected Sign
SEXHH	Sex of the household head	Dummy	1=male,0=female	-
EXPER	Faba bean farming experience	Continuous	In years	+
EDLHH	Education status of the household head	Continuous	Years of schooling	+
LANDSIZE	Land allocated to faba bean production	Continuous	Hectares	+
IMPSEED	Improved seed utilization	Dummy	1 = yes,0 = no	+
CREDIT	Access to Credit	Dummy	1 = yes,0 = no	+
DMARKET	Distance to nearest market	Continuous	Walking hours	-
FAMSIZE	Family size	Continuous	Man equivalent	+
LIVESTOCK	Number of livestock owned	Continuous	TLU	+
ACCMINFO	Access to market information	Dummy	1 = yes,0 = no	+
NINCOME	Income from non-farm Activities	Dummy	1 = yes,0 = no	+

Source: Author's own construction (2018)

### 3. RESULTS AND DISCUSSION

#### 3.1 Demographic and Socioeconomic Characteristics of Sampled Respondents

The average family size of the sampled households head in labor force unit was 7.89 persons per family with standard deviation of 2.55, and the minimum of 3 and maximum value of 15, respectively. This large number of economically active force was very important to perform necessary production related activities within required period of time. For this reason, family size of sampled households head in the study area was converted into labor force unit.

As depicted in Table 3, the average years of schooling of the sampled households was 5.25 years ranging between 0 and 10 with standard deviation of 2.71. This indicates that some sampled households did not attending formal education while other attended formal education from 1 to 10 in the study area. Livestock is also an important asset for farm households in the study area and it has multiple purposes including draught power, manure, basic sources of cash income and consumption for the households. Accordingly, the average livestock holding in tropical livestock unit of sampled households was 5.56 ranging from 1.26 to 18.76 with standard deviation of 3.93.

Table 3: Descriptive statistics for continuous variables used in the analysis

Variables	Min	Max	Mean ( N = 132)	Strd. Dev.
Age	22	75	43.37	12.71
Education level	0	10	5.25	2.71
Family size	3	16	7.89	2.55
Distance to nearest market	0.5	5	2.78	0.95
Number of livestock own	1.28	19	5.56	3.93
Extension contact	0	5	2.84	1.79
Farming Experience	4	53	23.2	11.91

Source: Own computation from survey result (2018)

Table 3 also showed that, the average number of extension contact by development agents was 2.84 ranging from 0 to 5 visits per cropping season with standard deviation of 1.79. This indicates that some sampled households visited five times in one cropping season and others have no chance to be visited by such agents. And this could promote the variation in amount of faba bean produced among sample households in the study area.

According to the survey result, the average distance from the sampled households to nearest market was 2.78 with the minimum and maximum time far from households home to market was 0.5 and 5, respectively and standard deviation of 0.93 (Table 3). The average years of farming experience related to faba bean production during the survey period was 23.20 years and minimum and maximum years was 4 and 53, respectively with standard deviation of 11.91 as shown in Table 8 below.

#### 3.2 Determinants of Faba bean Sales Volume

The multiple regression model was intended to examine factors affecting the sales volume of faba bean by the sampled households. According to this study, all the sampled households were supplied the produce to the market. Before running the model, all the hypothesized explanatory variables were checked for the existence of multicollinearity and heteroskedasticity problems associated with multiple regression analysis, and the normality of residuals were tested (Appendix Table).

Eleven explanatory variables were hypothesized to determine the Faba bean sales volume. Among those variables four variables namely education level of the household head, number of livestock owned, farming experience on faba bean, and distance to the nearest market influenced the sales volume of Faba bean positively while income from non-farm activities had negatively and significantly influenced the sales volume of faba bean (Table 4).

Table 4: Determinants of faba bean sales volume

Variables	Coef.	Robust Std. Err	t-value	P> t
SEX	0.07	0.20	0.34	0.733
EDUC	0.82***	0.12	7.02	0.000
EXPER	0.10***	0.02	5.50	0.000
IMPSEED	0.21	0.20	1.04	0.300
ACCMKT	0.48	0.34	1.39	0.170
CREDIT	-0.41	0.30	-1.36	0.180
DMARKET	0.24**	0.11	2.23	0.030
LIVSTOCK	0.11***	0.03	3.04	0.003
FAMSIZE	-0.03	0.04	-0.79	0.432
NINCOME	-0.38*	0.22	-1.70	0.092
LANDSIZE	0.09	0.10	0.92	0.360
_cons	-2.22	0.66	-3.38	0.001
N				132.00
R-Squared				81.25
Adj R-Squared				79.54

\*\*\*, \*\*, and \* are statistically significant at 1, 5, and 10 percent, respectively

Note: Dependent variable is quantity of faba bean sold in quintal,

Source: Own computation from survey result (2018)

**Education level of the household:** Education level of the household head positively and significantly influences the quantity sold of faba bean at 1% probability level. The regression coefficient also confirms that, a one year increase in the formal years of schooling of sampled households increases the sales volume of faba bean by 0.82 quintal, keeping other variables constant. This can be explained by the fact that as an individual gets formal education he/she is empowered with the production and marketing skill and knowledge that were outgrowth individual to produce more and thereby increases the sales size of the crop. This result is also in line with the finding of Astewel (2010) who found if rice producer gets educated, the amount of rice supplied to the market increases which suggests that education improves level of sales that affects the marketable surplus.

**Farming Experience:** Similar to the prior expectation, farming experience of faba bean had been positively and significantly associated with the sales volume of faba bean at 1% probability level. The coefficient of regression result also revealed that as sampled household's farming experience of faba bean production increases by one year, the quantity sold of faba bean was also increased by 0.10 quintal, keeping other variables constant. It implied that, if the sample household has much faba bean production experience, the amount of faba bean supplied to the market becomes increased as households with more farming experience are more likely to produce more. This result is in line with the finding of Dagmawit (2016) who found that as farmers' gets older, they could acquire skills and hence produce much and developed skills to participate in maize market.

**Distance to nearest market:** This variable result contrary to the hypothesized one, shown distance to the nearest market was found to be positively and significantly influences the sales volume of faba bean at 5% probability level. The model result revealed that, as the distance to nearest market increased by one walking hour, the quantity sold of faba bean increased by 0.24 quintal, keeping other variables constant. The possible explanation for this is that those sampled households distant away from the market place have large size of farmland, which helps them to increase their production capacity and thereby sale more quantity compared to sampled households closer to the market. The study result in line with that of Shewaye *et al.* (2016) who found that, distance from the nearest market was positively and significantly affects the level of market participation at 10% significance level.

**Number of Livestock owned:** As it was hypothesized, this variable was found to influence the sales volume of faba bean positively and significantly at 1% probability level. The result showed that, one number increases in tropical livestock unit leads to 0.11 quintal increase in the sales volume of faba bean, holding other variables constant. The implication of the result was that livestock are important sources of income in the rural areas to allow the purchase of farm inputs that are needed to increase the production capability of households which in turn increases the sales size. Moreover, households owned more livestock assets have better animal manure as input of production which can helps to increase production and thereby quantity sold. This result consistent with the findings of Sultan *et al.* (2017) who found that an increase in the value of livestock owned tends to an increase in the volume of sale.



**Non-farm income:** Non-farm income size was hypothesized to influence the quantity sold of faba bean negatively and significantly at 10% probability level, contrary to the hypothesized one. The result showed that, on average, increase in income from the non-farming activities directs to the household to decrease yearly faba bean sales by 0.38 quintal, holding other variables constant. The implication is that, a household with better income from non-farming activity is assumed to have low sales volume of faba bean because the shift towards non-farm income generating activities declines the concentration of crop production and thereby the sales size.

#### 4 SUMMARY AND CONCLUSION

Faba bean production is the major component of farming system in Chelia district. It contributes significantly in consumption and cash income generation to households. In this regard, the study was undertaken with the objective of examining factors affecting faba bean sales volume. This study was used cross-sectional data from both primary and secondary sources. Primary data was collected from 132 respondents by using structured questionnaire. Secondary data were extracted from District Office of Agriculture, District Trade and Market Development Office and its associated primary cooperatives, different published and unpublished materials. Multiple linear regression model was used to estimate determinants of Faba bean sales volume in the study area with the help of eleven independent variables. Out of those variables four variables namely education level of the household head, number of livestock owned, farming experience on faba bean, and distance to the nearest market influenced the sales volume of Faba bean positively while income from non-farm activities had negatively and significantly influenced the sales volume of faba bean.

To sum up, all the factors identified in this study were very important factors to be given adequate attention in the study area to improve and sustain the competitiveness in the faba bean value chain and to improve households' livelihoods. Faba bean produces produced in the study area passes through several intermediaries before reaching the consumers. The intermediate buyers purchase faba bean produce from producers at a lower price and sale to the end users at a higher price. The linkages among producers and other actors were to some extent weak and informal. Thus, this needs that producers have the opportunity to integrate with traders to increase the availability of faba bean production and productivity and thereby increase the sales volume of Faba bean in the study area.

#### Recommendation

Keeping the finding of the study in the summary and conclusions above into consideration, this study recommends that, strengthening the provision of education, improving producers knowledge and experience on faba bean production, expanding accessibility of market infrastructure, and enhancing crop-livestock production was suggested in the study area to increase production and thereby increase the sales volume of Faba bean in the study area.

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