Kocho Market Supply by Enset Farm Households: Empirical Evidence from Lemo District of Hadiya Zone, Central Regional State of Ethiopia

ABSTRACT

In Ethiopia, enset is a strategic food store suitable to alleviate food scarcity, and it is a dependable source of income in areas where it is grown. Lemo District in Hadiya zone is one of the major enset producing districts. However, there is no empirical evidence regarding kocho marketing in the district. The purpose of this study was to identify factors affecting kocho market supply by enset farm households in Lemo district. The study used a cross- sectional study design. The data were collected from 208 randomly selected enset farm households in the district by using a pre-tested semi-structured questionnaire. A multiple linear regression was employed to analyze the data. The regression result indicated that age of the household head, household size, area under enset cultivation, livestock holding and yields obtained from crops other than enset had significantly influenced kocho market supply by enset farm households in the study area. Based on the findings of the study, enset production and marketing should get focus from the government and/or non-government organizations to put enset farmers in a better life by providing training regarding expansion of other supplementary feed sources, strengthening of the culture of kocho marketing and the ways of increasing the per unit kocho yield.

Keywords

Kocho, enset, volume, market supply, Lemo district, Ethiopia

1. INTRODUCTION

Enset (*Ensete ventricosum(Welw.) Cheesman)* is a tall herbaceous plant from tropical Eastern Africa, sometimes called false-banana due to its physical resemblance to a banana plant (Birmeta et al., 2004; Shigeta, 1992), and its farming is one of the most important agricultural activity in Ethiopia (Brandt et al., 1997). Enset is grown for its starch-rich basal pseudostems (trunks) and their swollen underground parts, called corms, which are an important staple food for the inhabitants of the southern and south-western areas of the country, and all other parts are useful for different purposes. It serves as house construction material, cattle feed, source of fiber and plates, as a wrapper when cooking bread (Brandt et al., 1997; Desta & Oba, 2004; Tsegaye & Struik, 2002). In addition, some enset clones are also very crucial in local healthcare systems for humans and livestock. Health problems like broken legs, wounds and maternity related problems can be treated by medicinal enset clones (Olango et al., 2014)

Enset provides a starchy food from its pseudostem, corm, and the stalk of its inflorescence. The most important food products prepared from enset are kocho and bulla. Kocho is obtained from a mixture of the scraped pulp of the pseudostem, pulverized corm, and stalk of the inflorescence. The mixture is stored in pit lined by enset leaves for fermentation. Bulla is the more quality than kocho, and available in small quantity which is obtained by squeezing the mixture of scraped pulp of the pseudostem and its pulverized corm and then decanting the liquid (Tadesse et al., 2024; Tsegaye & Struik, 2002). A fleshy inner portion of enset corm cooked and eaten as potatoes, named amicho, is also another important food from enset which is mostly used when there is food scarcity. Not all enset clones are preferred for amicho but some selected clones are used to prepare amicho. As a by-product of kocho and bulla processing, enset also provides fiber which has an excellent strength equivalent to abaca fiber (the world's strongest) (Brandt et al., 1997; Shigeta, 1992).

Enset is a very important cultural and socio-economic crop for large number of smallholder farmers in many parts of south and south-western Ethiopia (Tsegaye & Struik, 2002), and has a proven potential for fighting famine (Aneseyee et al., 2022). Formerly, it has been grown for several years as a food security crop to obtain food for home consumption. Marketing its products, mainly kocho and bulla, were considered as culturally and socially unacceptable. Currently, enset products serve as a noticeable source of income for producers (Aneseyee et al., 2022). As reported by CSA 2019, about 98002435 enset plants were harvested and processed to produce 50171871.37 quintal kocho. Of this amount, about 68.78 percent (34509385.36 quintals) were from the Southern parts of Ethiopia. From the total area covered by enset production in Ethiopia, this region covers about 80percet.

Regardless of its role in cultural, socio-economic and gender dynamics in different cultural groups of the country, enset production and marketing has got little attention from governmental and non-governmental development workers. Extension support services regarding production, processing and marketing are limited in enset production leading to underutilization of the potential contribution of enset for smallholder farmers' cultural, social and economic values (Olango et al., 2014).

The Hadiya people in Ethiopia are characterized by a predominant commitment to enset-growing combined with grains, barley and maize, as well as rearing of domestic animals (Peveri, 1997). Lemo district in Hadiya Zone is one of the known districts to have

maximum enset cultivation. In this district, enset cultivation plays a considerable role in supplementing farm income. On the other hand, cereal (wheat and barley) and pulse (field peas and faba-beans) crops are the most important cash sources for smallholder farmers in the study area. During 2019 production year, approximately 26372 tons of kocho were supplied to the market (LDTIDO, 2019).

In this era, the idea of marketing concept is preoccupied with the idea of satisfying the needs of the customer by means of the product as a solution to the customer's problem. Therefore, for marketable goods, a production system considering the desirable traits of a product in the market is crucial to raise production, satisfy the customers and realize what the market needs. This can be achieved by providing modern and improved methods of producing, processing and marketing of the product under consideration. Previous researches gave due attention to production constraints and controlling methods (Kusse et al., 2021; Olango et al., 2014; Pijls et al., 1995; Tsegaye & Struik, 2002); disease assessments, and soil rehabilitation roles (Tamire, 2015); and socioeconomic and environmental aspects (Aneseyee et al., 2022). However, the marketing aspects of enset products, particularly kocho, are not well investigated. As a result the potential for market orientation is not well understood. Therefore, this study was aimed at investigating the demographic, socioeconomic and institutional factors affecting smallholder kocho producers' market participation in Lemo district of Hadiya Zone.

2. EMPIRICAL LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Based on the conditions of market demand, the improvement in marketing process and the volume of market supply is subject to effective supply chain management which is the strategic tool by which operational decisions are made leading to the performance of the entire supply chain optimization. It guarantees that every resource seamlessly reaches the marketing team and potential customers by forming a network between suppliers, production capacities, warehouses, wholesale and retail centers through which products are purchased, transformed, and delivered to the consumers and users (Dumitru & Căescu, 2013). A well-coordinated function of supply chain optimizes its performance. However, the changing condition of the socio-economic environment in which the marketing is operating makes the coordination very difficult (Barrales-Molina et al., 2010). Thus, market supply system must always organize the activities significantly affecting its performance.

It is indicated in the empirical study that demographic, economic and institutional factors affect the level of market supply and participation. Demographic factors such as age of the household head (a proxy for experience), gender, education and family size; institutional factors such as market and input supply distance, access to training and credit services and membership in cooperatives; and economic factors such as land size, farm income, output level, participation in off-farm activities and livestock holding are strongly linked with market supply and participation. For instance, a study conducted by (Tadie & Lemma, 2018) indicated that age, land size, output level, family size and livestock holding were significantly connected with the extent market supply of teff among smallholders producers.

Accordingly, the factors affecting market supply in this study were selected and listed based on the farming system of the study area, and by considering the laws behind supply

and demand analysis. Thus, the empirical literature support of the factors hypothesized to affect the level of kocho market supply in the study area described as follows:

Gender: In the context of the study subject, although women play considerable role in enset farming, men are more exposed and familiar, with enset farming activities than women because enset farming demands men's labor for cultivation. Women involve mainly in processing. Therefore, a household with male head is may have more enset for processing which in turn leads to have more kocho supply by the household. Similarly, a study conducted (Belete & Nigatu, 2023; Kifle et al., 2022) indicated that a male headed household is more likely to sell more teff in the market. Therefore, maleness is expected to have a positive and significant effect on the level of kocho supply.

Age: This is a proxy variable for farming experience. In the context of enset farming, the farmer gets more experienced in enset farming as s/he gets older. It is also supposed that enset farm become more productive with the farmer age. Farmers with more experience in production and marketing of a products become more supplier than farmers with less experience (Ayele et al., 2021; Belayneh et al., 2022). As a result, age as a proxy variable for farming experience is hypothesized to affect kocho market supply positively.

Education: It is expected that education contributes to farmers' knowledge level. It enables them to be exposed for new production and marketing information. As a result, they produce based on the information they have. (Delele et al., 2022) studied the link between education level and the market supply of soybean in Northwestern Ethiopia and found that soybean farmers with more education have supplied more soybean than less educated farmers. Similarly, in this study, education level is hypothesized to affect kocho market supply positively and significantly.

Market distance: This refers to the distance in kilometer from the residence of the farmer to the nearest market place. A multiple linear regression result in the study conducted by (Delele et al., 2022) indicated a negative and significant relationship between market distance and supply of soybean by farmers in northwestern Ethiopia. A Heckman two- step outcome equation result in the study conducted by (Worku et al., 2022) indicated a negative and significant relationship between walking minute from the farmers residence and the quantity of chickpea supplied to the market. That is a minute increase in the market distance decreases the quantity of chickpea supply by 0.02 quintal. Similarly, in the context of kocho marketing, the quantity to supply in the market is expected to decrease when the nearest market place is far apart from the residence of the farmer. Therefore, a negative and significant relationship is hypothesized between kocho market distance and the quantity of kocho supplied.

Market information: Market information aids in the farmer's decision making process. A farmer must select when, where, and how he will sell his produce and purchase his inputs. It could be market intelligence (a record of what has occurred previously) and/or market news (up-to-data information on prices, arrivals, and market circumstances). Therefore, access to market information is vital because it enable farmers to make reasonable decisions regarding the place and time to sell their product, and the price to receive for their product. As indicated in the literature, having access to market information positively and significantly affected the volume of date (fruits that grow on the date palm tree) by date producers (Asfaw et al., 2022). Similarly, (Delele et al., 2022) reported a positive and significant relationship between soybean market supply and

access to market information. In this study, based on the literature, having access to market information is expected to affect kocho market supply positively and significantly.

Extension Service: The provision of extension service is assumed to improve the farmers' knowledge and skill in agricultural production and marketing. Farmers getting better extension service are expected to have more knowledge and skills of enset production and its products marketing that would improve the market supply. The finding in the literature confirms that the frequency of extension contact positively and significantly impacted the volume of agricultural products supplied by smallholder farmers (Ayele et al., 2021; Delele et al., 2022). Therefore, a more frequent contact for extension service is expected affect kocho market supply positively or significantly.

Livestock ownership: In enset based farming system, livestock production complements with enset production. The manure produced from livestock can be used to fertilize enset farm. In turn, the livestock can get feed from enset farm mainly during feed shortage. It is indicated in the literature that keeping livestock by smallholder farmers significantly contributed to the level of market supply(Ayele et al., 2021; Belayneh et al., 2022; Delele et al., 2022).

Land size for enset: Land is very important input for enset production. If more land size is allocated for enset production, there will be more kocho production that would more likely increase the market supply. Findings of the study by (Asfaw et al., 2022; Belayneh et al., 2022; Geremewe, 2019) found a positive and significant relationship between land allocated for a specific crop production and market supply. Similarly, land size is hypothesized to affect the market supply of kocho positively.

Crop output: In enset based farming, particularly in the study area, the households' food consumption need is mainly satisfied from enset farm, that is, enset is mainly a food crop. If the households' income requirement is partly or fully made by selling other crop output, the household may not supply kocho to the market. Similarly, a study conducted by (Belete & Nigatu, 2023) indicated a negative relationship between household income and market supply. That is, farmers participating in alternative income sources less likely supply teff to the market. Therefore, a negative relationship between other crops output and kocho market supply is hypothesized in this study.

3. CONCEPTUAL FRAMEWORK

The conceptual framework developed and presented in figure 1 is based on the literature on factors affecting smallholder farmers' market participation and extent of market participation (Azeb Bekele et al., 2017; Endalew et al., 2020; Haile et al., 2022; Kalauba et al., 2022; Nigus et al., 2024; Worku et al., 2022; Zakari et al., 2023).

The concept of extent of market participation is clearly defined before developing the conceptual frame. The extent of market participation refers to the level by which a farm household participates in the market as supplier or seller (Gebremedhin & Jaleta, 2012). Accordingly, farm households can produce marketable commodities but totally consume at home. Farm households may also have high market participation because of different, demographic, economic and institutional factors affecting their state of market participation. Thus, the extent of enset farm households' market participation in kocho market is determined by household head characteristics such as age, education and gender; economic factors such as household size, land size, farm income and livestock

holding, and institutional factors such as market information, market distance and extension services.

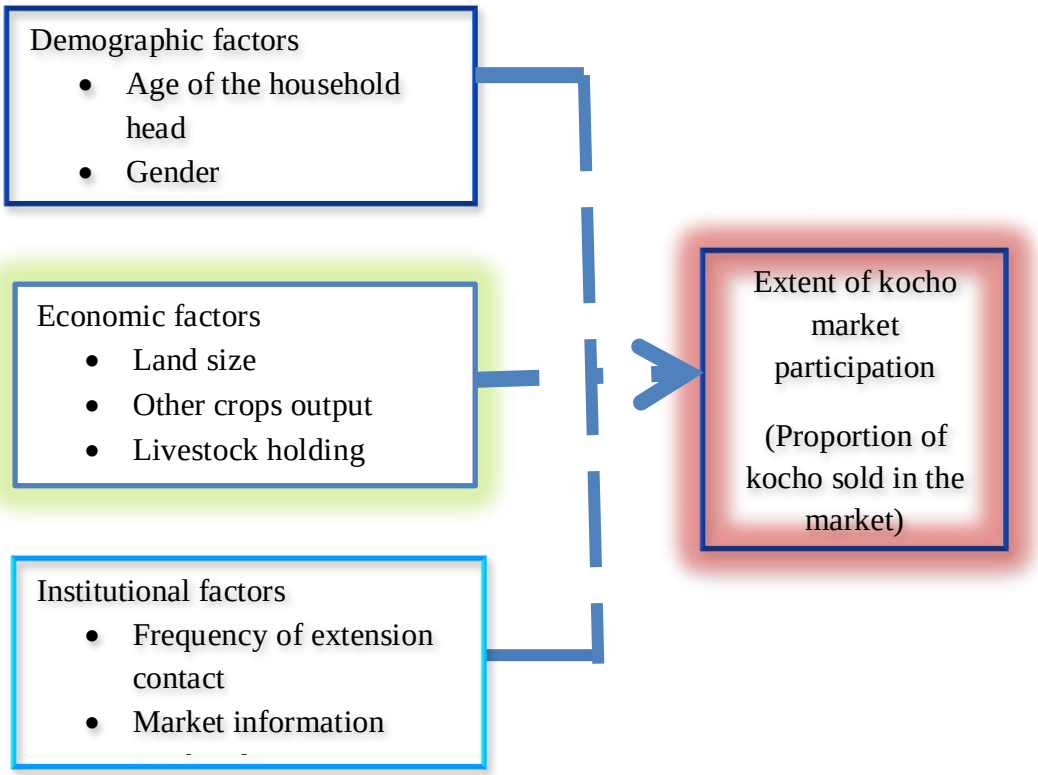

Figure 1 Conceptual framework of factors affecting household level kocho market supply

4. RESEARCH METHODOLOGY

4.1.Description of the study area

The study was conducted in Lemo district of the Hadiya zone in the Central Regional State of Ethiopia. The district was purposively selected based on its potential for kocho production and marketing. It is composed of 32 rural kebeles and three town kebeles[1] with total area coverage of 354 km^2. Based on the 2007 census conducted by the CSA[2], Lemo district has a total population of 118,594, of whom 58,666 are men and 59,928 are women. From the total population, 2,049 (1.73%) are urban residents.

Geographically, Lemo district lies between latitude 07^0 41$^{'}$ N and longitude 037^0 31′E. The mean annual temperature of Lemo district ranges from 15.1^{o}C to 18^{o}C with an elevation of 1950 to 2400masl. It has an average annual rainfall of 1150mm. Hosanna city, which is the capital of Hadiya Zone located at 232km away from Addis Ababa in southwest direction via the Butajira main road is the administrative center of Lemo district. The district is bordered to the south by the Kembata Tembaro Zone, to the southwest by Duna and Soro districts, to the west by Gombora district, to the northwest by Misha district, to the northeast by Ana Lemo district, and to the southeast by Shashogo district of the Hadiya Zone. The dominant land-use type in the district is mixed farming and rain-fed agriculture with cultivated land accounting for 89% of the total land area

[1] Kebele is the smallest administrative unit in Ethiopia.
[2] CSA stands for central Statistical agency of Ethiopia.

(LDARD, 2020). The major food and cash crops grown in the district are enset, maize, teff, wheat, barley, potatoes, faba beans, field peas, and other cereal crops and vegetables. Nowadays, kocho production and marketing become one of the important cash source for smallholder growers in the study area. Livestock rearing such as cattle, sheep, goats, and poultry, which are the main livestock production practices in the district.

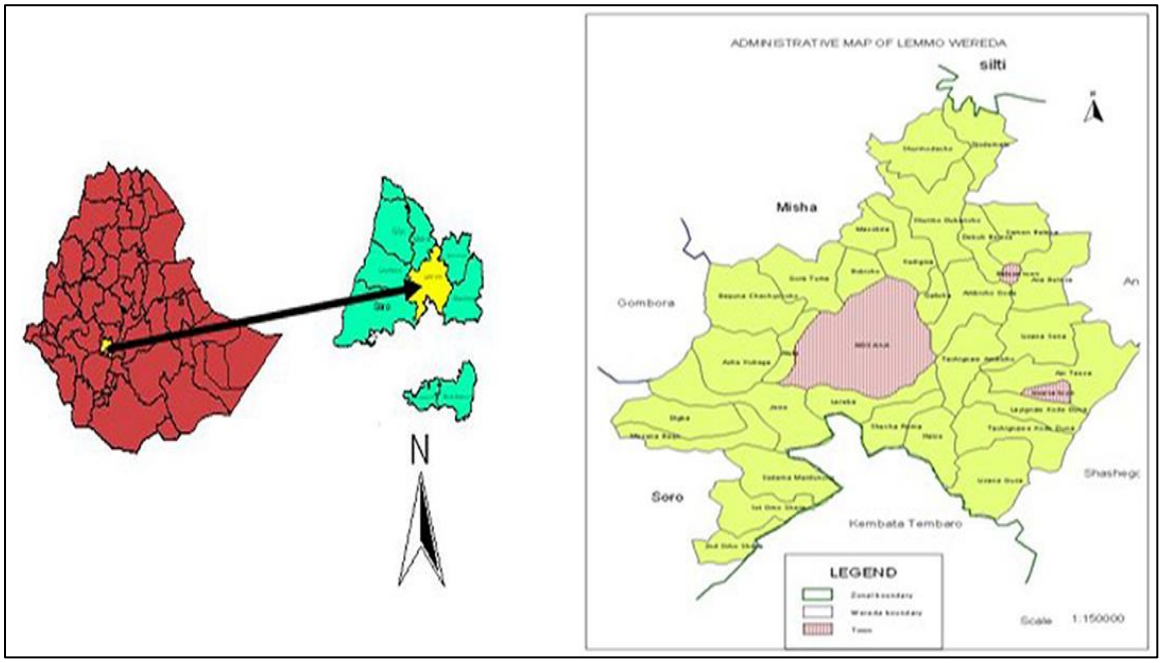

Figure 2: Location map of the study area, Lemo district

4.2. Data sources and method of data collection

The study used both primary and secondary data. Primary data were collected from the enset producers via face-to-face household interviews using semi-structured questionnaire. Focus group discussions and interviews with key informants (who are assumed to have in-depth knowledge about enset production and marketing) were conducted using semi-structured checklists before face-to-face interviews. The discussion was conducted to obtain commonly perceived information from the group. Based on the information obtained, the interview questionnaire was designed and pre-tested to evaluate its appropriateness for the producers' survey. The data were collected by enumerators working as development agents in the districts because they are expected to have better understanding of the study area. The primary data collected from enset producers included the demographic, socioeconomic and institutional factors affecting kocho production and market supply. Data sources such as research articles, published and unpublished documents, and the districts and zonal agricultural departments were considered as secondary source to support the primary data.

4.3. Study design

The study used both quantitative and qualitative data, and employed a cross-sectional study design by which the data are collected at a specific point in time. This design helps to study exposure and outcome status simultaneously.

4.4. Sampling design and sample size

Enset producer in Lemo district of Hadiya Zone were the population of the study. Accordingly, a two-stage sampling technique was employed to obtain a representative sample. In the first stage, kebeles were stratified based on the production and marketing level of enset products, particularly kocho as very high, high, medium and low producers. Four kebeles, one from each stratum, were randomly selected. In the second stage, the household lists of the four sampled kebeles were updated, and samples were selected by employing systematic random sampling based on the population proportion to the size of the households in the kebeles. Accordingly, 208 sample enset producers were selected using Yamane's (1967) simplified formula.

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

where n = intended sample size, N = total number of enset-producing households (42245) e = precision level at 7%. The sample distribution in the selected kebeles is described in the table below.

Table 1: Enset producers' sample distribution in the selected kebeles at Lemo woreda

Name of Kebele	**Total enset producing households**	**Sample size per kebele**
Upper Gana (Very high producer)	725	55
Jawe (High producer)	615	47
Lereba (Medium producer)	678	52
Ashe kubaega (Low producer)	705	54
Total	**2723**	**208**

Source: Own computation (2020)

4.5.Methods of data analysis

To address the objective of the study, both descriptive and econometric methods were used in this study. Descriptive statistics, such as percentages, frequencies, means, and standard deviations, were used to describe the demographic, socioeconomic and institutional characteristics of the sampled households. Multiple linear regressions were used to analyze the factors affecting the kocho market supply in Lemo district.

Econometric Analysis

For evaluating the market supply of any given agricultural product, the choice of econometric model to assess the casual relationship between the dependent and the predictor variables largely depends on the nature of the product under consideration. Tobit regression, Heckman two step model and Double-Hurdle model are best suited if the product under consideration is not supplied by all respondents. The dependent variable of these models has two parts: zero value for non-market participant and a continuous value such as quintals of produce sold or extent of extent of participation. That is, some respondents replied that they haven't delivered any volume of the product to the market. The application of these techniques can estimate both the probability of participation and the level of participation. On the other hand, in the literature, OLS technique is the most preferred approach when all survey participants replied that they

have delivered considerable amount of the product to the market (Green 2012; Gujarati 2004).

The casual relationship between dependent variable and multiple predictor variables can be estimated by a multiple linear regression statistical method by taking into account the assumptions underlying the data's normality, linearity, extreme values, and missing values (Uyanık & Güler, 2013). Different scholars such (Ayele et al., 2021; Azeb Bekele et al., 2017; Belayneh et al., 2022; Delele et al., 2022; Geremewe, 2019; Mulatu, 2024) applied multiple linear regression analysis to identify important socio-economic and institutional variables associated with extent of farm-households' market participation. Accordingly, the casual relationship between different socio-economic and institutional variables and the volume of kocho supplied by enset-farm households was assessed through the ordinary least square (OLS) regression method, multiple linear regressions, because all sampled farmers have supplied kocho to the market. Thus, based on Gujarati (2004), the multiple linear regressions model for the question under consideration is described as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \mu_i$$

Where Y is the quintal of kocho supplied to the market by enset farm households, β= a vector of estimated coefficients of the explanatory variables, X is a vector of explanatory variables, $\mathcal{U}$= error term.

Where,

Y_i - refers the quantity of wheat supplied to the market,
X_1 - represents the gender of the household head taking 1 if male headed, otherwise zero
X_2 – represents age of the household heard measured in years
X_3 – represents education level of the household head measured in number of years spent in education
X_4 – represents household size
X_5 – represents the nearest market distance measured in kilometer
X_6– represents access to market information taking a value of 1 if the household has access to market information, otherwise zero
X_7 – represents the per year number of times that the household contacted with extension service
X_8 – represents the total number of livestock owned by the household which is measured in tropical livestock unit (TLU)
X_9 – represents the total area in hectare which is covered by enset
X_{10} –represents output obtained from other crops which is measured in quintal
β_0 – represents the intercept
β_i – represents the parameter of the i^{th} explanatory variable
μ_i – represents the error term

Working hypotheses between dependent and explanatory variables

The potential explanatory variables that are expected to influence the dependent variable (kocho market supply) and their expected effect are indicated in Table 2

Table 2: Summary of hypothesized variables that determine kocho market supplied by enset farmers in Lemo district during 2020

Variables	Type	Expected effect	Literature Support of the hypothesis
Dependent variable			
Volume of Kocho Supplied to the market	Continuous		
Independent variables			
Sex of the household head (1=male and 0=female)	Dummy	+	(Belete & Nigatu, 2023; Kifle et al., 2022)
Age of the household head in years	Continuous	+	(Ayele et al., 2021; Belayneh et al., 2022)
Education level of household head (years)	Continuous	+	(Ayele et al., 2021; Delele et al., 2022)
Household size	Continuous	-	(Delele et al., 2022)
Nearest market distance (in Km)	Continuous	-	(Asfaw et al., 2022; Delele et al., 2022; Worku et al., 2022)
Access to market information (1= have access and 0=otherwise)	Dummy	+	(Asfaw et al., 2022; Delele et al., 2022)
Per year extension contact (Number)	Continuous	+	(Ayele et al., 2021; Delele et al., 2022)
Livestock kept (TLU)	Continuous	+	(Belayneh et al., 2022)
Area covered by enset (in Ha)	Continuous	+	(Asfaw et al., 2022; Belayneh et al., 2022; Geremewe, 2019; Mulatu, 2024)
Other crops output (in Quintal)	Continuous	-	(Belete & Nigatu, 2023)

5. RESULT AND DISCUSSION

5.1. Characteristics of sampled enset producers

Descriptive statistics were used to describe demographic, socioeconomic and institutional characteristics of the sampled households. The descriptive statistics such as mean, frequencies, standard deviation and percentages were used to describe the household characteristics. Accordingly, from the descriptive statistics results in Table 3, about 63.46 percent of the sampled enset producing households were male-headed, and 36.54 percent were female-headed which indicates the majority of the enset producing households were male headed. From the total enset farm households interviewed, 51.92 percent responded that they had access to market information regarding kocho production and marketing, whereas 48.08% replied that they had no access to market information.

The mean age of the sampled enset farm household heads was 44.19 years with standard deviation of 11. 33, indicating the household heads were of productive age. Concerning

their literacy level, the mean years spent in education by the household heads was 3.760 years, with a standard deviation of 3.92. The mean household size of the sampled enset farm households was approximately 6 members per household, with a standard deviation of 2 household members (Table 3).

The average market distance traveled by kocho market suppliers is 3.14 km, with a standard deviation of 1.07 km. The market distance approximation was made based on the local knowledge of farm households about the walking minutes required to cover one kilometer. Regarding annual extension contacts, on average, households made 20.74 contacts per year with extension service providers to get information about kocho production and marketing. The average number of livestock kept by the sampled households measured in the tropical livestock unit (TLU) was 3.01, with a standard deviation of 1.28. Based on the survey report, the average area covered by enset was 0.26 ha with a standard deviation of 0.10 ha.

The average yield obtained from crops other than enset by sampled households was 5.44 quintals with a standard deviation of 2.20 quintals. The average amount of kocho produced by the sampled households was 9.47 quintals, with a standard deviation of 2.95 quintals. From the total kocho produced by the sampled enset producers, the average amount supplied to the market was 2.21 quintals with a standard deviation of 1.10 quintals. The statistic indicates that kocho is mainly produced for home consumption but considerably contributes to household cash (Table 3).

Table 3: Socioeconomic characteristics of sampled kocho producers in Lemo district during 2020

Continuous Variables	**Descriptive Statistics**			
	Minimum	**Maximum**	**Mean**	**Standard Deviation**
Age of the household head	25.00	70.00	44.19	11.33
Years spent in education	0.00	12.00	4.54	3.92
Household size	3.00	10.00	5.97	1.65
Nearest market distance (km)	1.00	6.50	3.14	1.07
Extension visit per year (No.)	2.00	48.00	20.74	11.47
Tropical livestock unit (TLU)	0.50	6.00	3.01	1.28
Area covered by enset (Ha)	0.06	0.45	0.25	0.10
Other crops output (Quintal)	1.250	13.000	5.444	2.195
Kocho yield sold (Quintal)	0.500	5.500	2.209	1.096
Kocho yield produced (Quintal)	4.500	15.500	9.471	2.950
Dummy Variables	**Response**	**Frequency**	**Percentage**	
Sex of the household head	Male	132	63.46	
	Female	76	36.54	
	Total	**208**	**100**	
Access to market information	Have access	108	51.92	
	Have no access	100	48.08	
	Total	**208**	**100**	

Source: Own survey (2020)

5.2. Marketed surplus from the total production of kocho in Lemo district

From the marketing point of view, farmers sell part of their production if there is surplus production which is actually made available to non-producing consumers. The surplus production can also be increased by increasing the total production. Accordingly, the arrangement of market participation is only for the surplus quantity available with the farmers and not for the total production. Marketed surplus is the quantity of kocho from total production that producer actually sold in the market after fulfilling all the requirements.

Basically, in the study area, enset production is mainly for food, but producers sell parts of their product to support the income generated from other source, and the marketed surplus may be from the quantity available to fulfill other requirements. As it can be observed from the graph 3, this quantity varies irrespective of the variation in total production. Relatively poor and small volume producers may sell more to enable them to meet their cash obligations.

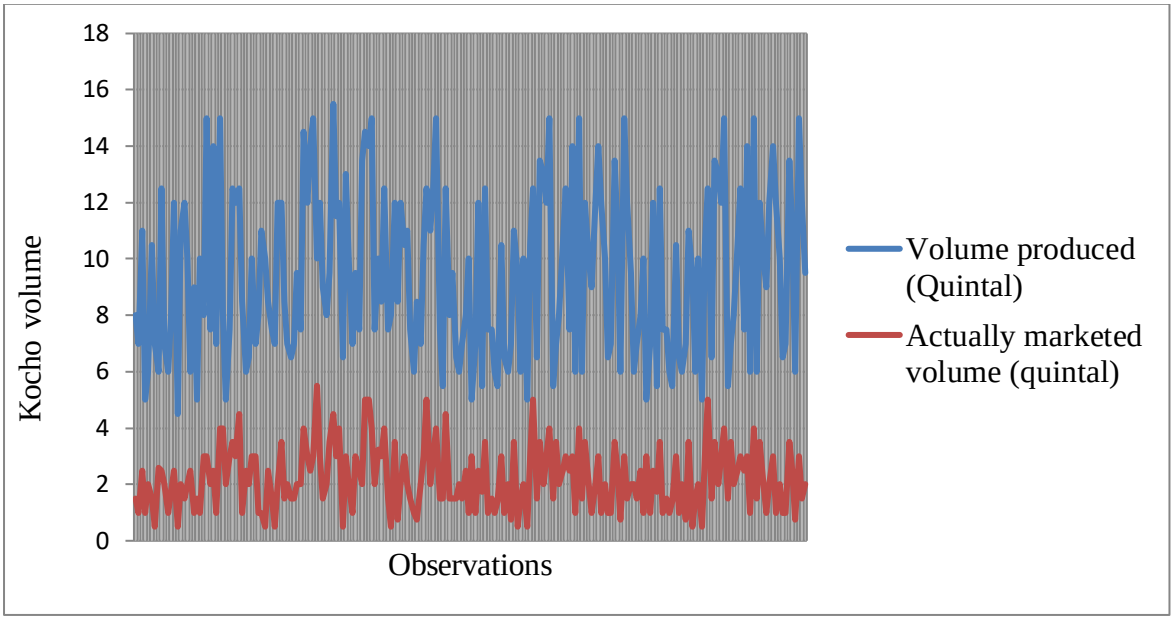

Figure 3: Household level kocho marketed surplus from the total production

5.3. Factors affecting *kocho* market supply in Lemo district

The multiple linear regression result of the estimating factors affecting kocho market supply by sampled farmers in Lemo district is indicated in table 4. The regression result showed that kocho market supply is determined by interaction of different demographic, socioeconomic and institutional factors. Before running the regression, the data were checked for satisfying the basic assumptions of the multiple linear regressions. The overall fitness of the model, R-squared, was 0.6291, which passed the test and indicated that approximately 63 percent variation in the volume of kocho supplied to the market was explained by variations in the variables included in the model. The presence of multicollinearity between explanatory variables was checked and there was no severe problem. The existence of specification problem was tested, and the test result indicated no variables were omitted during the model specification.

A total of ten variables hypothesized to determine kocho market supply. But five of them were found to have significant influence on household level kocho market supply in the study area. These are the age of the household head, household size, total number of

livestock kept by the household (measured in tropical livestock units), the area covered by enset cultivation, and the other crops output obtained by the household (Table 4).

The age of the household head influences kocho market supply positively at 1% significance level. The regression result implied that as the age of the household head increases by one year, the volume of kocho supplied to the market increases by 0.0207 quintal. This could be explained by the fact that aged farmers are expected to have more experiences about kocho production and marketing, thus they can easily access related information. The finding is in line with the study conducted by (Mossie et al., 2020; Sori, 2021) who found a positive relationship between the age of household head and market supply, but in contrast to the finding of (Deksiso & Gebru, 2022; Regasa Megerssa et al., 2020; Tadie & Lemma, 2018) which showed a negative relationship between age of the household head and market supply.

Household size influences kocho market supply negatively at 1% significance level. The most probable reason could be that kocho is mainly processed for home consumption in the study area. Increased household size means more mouths to consume kocho and fewer surpluses for market. The regression result indicated that a one family member increase in the household results in 0.202 quintal decrease in kocho market supply. The result is in line with the findings of the study conducted by (Belayneh et al., 2022; Haile et al., 2022; Regasa Megerssa et al., 2020) who found a negative relationship between household size and market supply; but in contrast with the findings of the study conducted by (Gelaw et al., 2023; Nigus et al., 2024; Worku et al., 2022) who found a positive relationship between household size and market supply.

The livestock ownership measured in the tropical livestock unit (TLU) was hypothesized to affect kocho market supply positively, but it influences kocho market supply negatively at 1% significance level. The most probable reason could be enset is one of the important livestock feed in the study area. As a result, keeping more livestock leads to uprooting more enset to supplement livestock feed resulting in low kocho production. The model results indicated that a one-unit increase in tropical livestock units decreases kocho market supply by 0.168 quintal, holding other factors constant. This result is in line with the findings of the study conducted by (Asfaw et al., 2022; Gebre et al., 2022; Haile et al., 2022) who found a negative relationship between size of livestock owned and market supply. However, in contrast to this findings, a study conducted by (Belayneh et al., 2022; Sori, 2021) found a positive relationship between size of livestock owned and market supply.

The area allotted to enset production influences kocko market supply positively at 1% significance level. The reason could be increased area under enset production increases kocho yield resulting in surplus kocho for market. The regression result indicated that a one-hectare increase in enset area increases kocho market supply by 5.491 quintals, while other factors remained constant. This result is confirmed by the study conducted by (Asfaw et al., 2022; Belayneh et al., 2022; Belete & Nigatu, 2023; Deksiso & Gebru, 2022; Delele et al., 2022; Geremewe, 2019; Kassaw et al., 2021; Mulatu, 2024; Sori, 2021) who found a positive relationship between farm size and market supply.

The output obtained from other crops influences kocho market supply negatively at less than 10% significance level. The most probable reason could be that increased output from other crop production makes the household to unwilling to supply kocho to the market for income generation. The regression result indicated that a one-quintal increase

in the output of crops other than enset decrease the kocho market supply by 0.039 quintal. The finding is in-line with the study conducted by(Belete & Nigatu, 2023) who found a negative relationship between

Table 4: Factors affecting kocho market supply level in Lemo woreda during 2020

Variables	Coefficient	Standard error	P-value
Sex of the household head	0.0275	0.1005	0.7850
Age of the household head	0.0207	0.0061	0.0010
Education level of household head (years)	0.0069	0.0128	0.5880
Household size	-0.2016	0.0322	0.0000
Nearest market distance (Km)	-0.0428	0.0533	0.4220
Access to market information (Dummy)	0.0476	0.0976	0.6260
Per year extension contact (Number)	0.0061	0.0056	0.2790
Livestock kept (TLU)	-0.1682	0.0418	0.0000
Area covered by enset (Ha)	5.4913	0.7500	0.0000
Other crop's output (Quintal)	-0.0394	0.0221	0.0770
Constant	1.7664	0.4468	0.0000
Number of Observation			208
F(10, 197)			33.41
Prob > F			0.0000
R-suared			0.6291
Adjusted R-squared			0.6002

Source: Own survey (2020)

6. CONCLUSION

Enset is a very important cultural and socio-economic crop for large number of smallholder farmers in Ethiopia. It has a proven potential for fighting famine. Formerly, enset has been grown to obtain food for home consumption. However, marketing kocho and getting income were considered as culturally and socially unacceptable activities. Now, kocho marketing serves as a noticeable source of income for producers. However, despite having huge output and marketability potential, kocho marketing study hasn't acquired adequate attention in Lemo district.

Using a multiple linear regression analysis, this study attempted to identify factors affecting kocho market supply in Lemo district. The regression analysis indicated that the age of the household head, household size, livestock holdings area, under enset cultivation and output from crops other than enset significantly influenced kocho market supply in the study area. Based on the survey findings, the researcher wanted to suggest direction to the smallholder enset farmers who like to engage in kocho marketing. Because enset is a strategic food store suitable to alleviate food scarcity and considerable cash source, its production and marketing should get focus from the government and/or non-government organizations to put enset farmers in a better life.

Enset farmers having increased output from crops other than enset are unwilling to supply kocho to the market. This may be due to bad cultural feeling, but this day kocho marketing is one of the most important cash source. Therefore, strengthening the culture of kocho marketing is essential to boost production and marketing. Since enset serve as supplementary feed source for livestock in the study area, expanding other feed source could be a better solution to increase kocho market supply by households with large numbers of livestock. Thus, the government and/or non-government organizations should focus on training farmers to have additional feed sources.

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