

**ASSESSMENT OF MILK MARKET CHAIN THE CASE OF
GIRAR JARSO DISTRICT IN NORTH SHEWA ZONE, OROMIA
NATIONAL REGIONAL STATE, ETHIOPIA**



**A Thesis submitted to Department of Management, C college of Business and
Economics. Salale University for Partial Fulfillment of the Requirement for
the Award of Master of Business Administration**

By:

Zewditu Berihun Yigzaw

August, 2022

Fitche, Ethiopia

**ASSESSMENT OF MILK MARKET CHAIN THE CASE OF
GIRAR JARSO DISTRICT IN NORTH SHEWA ZONE, OROMIA
NATIONAL REGIONAL STATE, ETHIOPIA**



Salale University

College of Business and Economics

Department of Management

**Thesis submitted to Department of Management, College of Business and
Economics, Salale University for Partial Fulfillment Requirement for the
Award of Master Business Administration**

By

Zewditu Berihun Yigzaw

Advisors: Thomas Haile (Assistant professor)

Mr. Tariku Firaw (MPM)

August, 2022

Fitche, Ethiopia

DECLARATION

I, **Zewditu Berihun**, do hereby declare this thesis work entitled “**Assessment of milk market chain in Girar Jarso district, North Shewa Zone, Oromia National Regional state, Ethiopia.**” It is my original work and it has not been submitted partially or full by any other person for award of degree of publication in any other university/institution.

Submitted by:

Zewditu Berihun Yigzaw

Signature _____ Date: August 2022 GC

CERTIFICATE SHEET

This is certify that the thesis entailed “**Assessment of milk market chain in Girar Jarso district, North Shewa zone, Ethiopia.**” submitted to department of management, college of business and economics, Salale university by **Zewditu Berihun** for the degree of Master of Business Administration, is original work done by the candidate under my supervision. I further certify that the entire thesis represents the independent work of **Zewditu Berihun** and all the research works were undertaken by the candidate under my supervision and guidance.

This thesis has been submitted for examination with my approval.

1. Main Advisor

Signature

Date

Thomas Haile (assistant professor) _____

2. Co-advisor

Signature

Date

Mr. Tariku Firaw (MPM) _____

APPROVAL SHEET

SALALE UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MANAGEMENT

BOARD OF EXAMINERS THESIS APPROVAL SHEET

The undersigned certify that I have read and hereby recommend department of management, Salale University, to accept the thesis entitled “**Assessment of milk market chain in Girar Jarso district, North Shewa zone, Ethiopia**” which had been submitted by **Zewditu Berihun** in partial fulfillment of the requirements for the award of a master degree in **Master of Business Administration**.

Submitted by:

Name of Student	Signature	Date
<u>Zewditu Berihun</u>	_____	_____

Approved by:

Name of Main Advisor	Signature	Date
<u>Thomas Haile (Assistant professor)</u>	_____	_____

Name of Co-Advisor	Signature	Date
<u>Mr. Tariku Firew (MPM)</u>	_____	_____

Name of External Examiner	Signature	Date
_____	_____	_____

Name of Internal Examiner	Signature	Date
_____	_____	_____

Name of Chairperson	Signature	Date
_____	_____	_____

Name of Department Head	Signature	Date
_____	_____	_____

ACKNOWLEDGMENT

It is the grace, mercy, charity, forgiveness, help and kindness of the almighty God-Jesus Christ that made me still alive, achieve this success and strength and to go through all the difficult time. There are several peoples who helped me in one way and another to achieve the completion of this thesis. The thesis would have not been possible without the guidance, support and expertise of my thesis advisor Thomas Haile (assist- prof), Dr Venkatesh A. and my co-advisor Mr Tariku Firew. So I would like to begin by thank my supervisors for constructive comments and outstanding help with this thesis, for allowing me the complete freedom to pursue this study. My deepest gratitude goes to, Mr Gaddisa, Mr Yibelital, and Mr Bekalu for they have helped me in one way or another to complete this thesis.

I am also indebted to my beloved family for their moral support and encouragement during my study in addition I would like to thank Bifitu Salale farmers' cooperative, agriculture office, key informants, respondents for their permission and cooperation during data collection for this study.

Table of Contents

DECLARATION	ii
CERTIFICATE SHEET.....	iii
APPROVAL SHEET	iv
ACKNOWLEDGMENT.....	v
LIST OF TABLES	ix
LIST OF FIGURS.....	x
ABBREVIATION AND ACRONYM	xi
<i>ABSTRACT</i>	xii
CHAPTER ONE	xiii
1. INTRODUCTION	13
1.1. Background of the Study.....	13
1.2. Statement of the Problems.....	3
1.3. Research Questions	5
1.4. Objectives of the Study	5
1.4.1. Specific objectives	5
1.5. Significance of the Study	5
1.6. Scope and Limitations of the Study	6
1.7. Organization of the Study	6
CHAPTER TWO	7
2. LITERATURE REVIEW	7
2.1. Definitions of basic term and concepts	7
2.2. Theoretical Review	8
2.2.1. Dairy marketing channels and outlets	8
2.2. 2. The role of milk in Ethiopian Economy	9

2.2.3. Milk Production systems in Ethiopia.....	9
2.2.4. Milk marketing systems in Ethiopia.....	10
2.2.5. Factors affecting milk production and marketing.....	11
2.2.6. Constraints and opportunities of the dairy sector	12
2.3. Review of empirical studies	13
2.3.1. Status of Milk production and Consumption in Ethiopia.....	13
2.3.2. Determinants of the volume milk market participation.....	14
2.3.3 Constraints of dairy production and marketing in Ethiopia	15
2.4. Conceptual framework	16
2.5. Summary of related literature and research gap.....	17
CHAPTER THREE	18
3. RESEARCH METHODOLOGY.....	18
3.1. Description of the Study Area.....	18
3.2. Research Approach	19
3.3. Research Design and Target population.....	19
3.4. Methods and Types of Data Collection.....	20
3.5. Sampling Techniques and Sample Size Determination	20
3.6. Methods of Data Analysis	22
3.6.1. Descriptive statistics	22
3.6.2. Econometric analysis.....	22
3.7. Variable Definition and Hypothesis	24
CHAPTER FOUR.....	28
4. RESULTS AND DISCUSSION.....	28
4.1. The Results of Descriptive Analysis	28
4.1.1. Demographic and socioeconomic characteristics of the sample households	28

4.1.3. Milk production and Lactation Period.....	32
4.2. Milk Market chain actors and their roles	33
4.2.1. Value chain map	33
4.2.2. Milk Market chain actors' role	35
4.3. Milk Marketing Chain.....	36
4.3.1. Milk marketing channels	36
4.4. Econometric Result and Discussion Factor Affecting Volume of Milk Market.....	38
4.4.1. Factors Affecting Milk Market supply (Volume of Sales).....	39
4.5. Milk Marketing Constraints	41
4.6. Opportunities for milk production and marketing.....	43
CHAPTER FIVE	45
5. SUMMERY, CONCLUSION AND RECOMMENDATION	45
5.1. Summery and Conclusion	45
5.2. Recommendation.....	47
6. REFERENCE.....	48
7. APPENDIX.....	54

LIST OF TABLES

Table 1: Total sample size of the study	21
Table 2: Hypothesis of variables used in milk market chain	27
Table 3: socio- economic behavior of respondents.....	28
Table 4: socio-demographic depiction of sample households by continuous variables	30
Table 5: Access to different supporting service/ enabling factor	31
Table 6: milk production, lactation period and number of cows owned	32
Table 7: Factors affecting volume of milk Sales estimation result.....	41
Table 8: constraints of milk market supply.....	42
Table 9: opportunities of milk marketing and production	44

LIST OF FIGURS

Figure 1: International milk consumption trend	13
Figure 2: conceptual framework of the study	16
Figure 3: Map of the study area	18
Figure 4: Educational level of household heads	29
Figure 5: map of milk value chain	34
Figure 6: channels of milk market supply.....	37

ABBREVIATION AND ACRONYM

AGP	Agriculture Growth Program
CC	Contingent Coefficient
CSA	Central Statistical Agency
FAO	Food and Agriculture Organization
OLS	Ordinary List Square
VIF	Variance Inflation Factor

ABSTRACT

The study was initiated with the objectives of analyzing milk marketing chains in the Case of Girar Jarso District in North Shewa Zone, Oromia National Regional State, Ethiopia. To select respondent, the researcher used random sampling techniques and 132 milk producer households were selected. The required data collected from both secondary and primary sources of data's. Descriptive and econometric methods of data analysis were also used. The market chain analysis found chain actors along with their roles and the core actors identified in the district were input suppliers, producers, collectors, cooperative, retailers and consumers. Collectors were larger volume of milk buyers in the study area and transport to Addis Ababas and Sebeta. The multiple linear regression model was employed to identify factors affecting the volume of milk market supply. The result of linear regression model show that education level of household, experience of households in milk production, number of cross breed cows, number of local breed cows, access to credit service and access to dairy extension service has positively and statically significant effect on the volume of milk market supply. Low price of milk and milk product, high price of dairy cows, shortage of feed, lack of credit, occurrence of animal disease and seasonality of demand particularly in fasting time were the major challenges of dairy marketing and production in the area. Dairy producers, retailers, collectors and cooperatives were found to be the main milk market actors of the study areas. Therefore, to improving milk market supply of milk producers the study finding suggested that, the concerned body have to enhance access of proper technical support service provision, access of credit, extension service and education is needed.

Keywords: *OLS Model, Milk, Market Supply, Ethiopia*

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

The agriculture sector's expansion is crucial to the development of emerging countries' economies. Agricultural expansion is critical for poverty reduction because 75 percent of the world's extremely poor people live in rural regions and rely on agriculture for their livelihood. About three-quarters of these extremely poor individuals rely on livestock for their livelihood, making livestock a key tool for overcoming poverty and boosting economic growth (FAO, 2011).

Africa is reliant on the agricultural sector, either directly or indirectly (OECD, 2016). Similarly, Ethiopia's economic progress is inextricably linked to the performance of the agricultural sector. Agriculture accounts for 36.2 percent of GDP and 72.7 percent of employment in the United States (CIA, 2017). Ethiopia is the first African country in terms of livestock resources, with 60.39 million cattle. Milking cows account for approximately 12.39 million of the total cattle stock (CSA, 2018). In Ethiopia, smallholder farmers keep 95 percent of dairy cattle, while barely 5% of raw milk enters the legal market (Shapiro *et al.* 2017).

Millions of rural farmers can benefit from dairy production in terms of employment, food, and cash Tegegne *et al* (2013). Dairy farmers used their earnings to acquire agricultural inputs, hire labor, rent land, and increase their food production and resiliency. Farmers, on the other hand, are under-represented in the market (Minten *et al.*, 2018).

In Ethiopia, lack of market access limits 31 percent of dairy value addition, and poor infrastructure causes 3.4 percent milk loss (Agricultural Growth Program Livestock Market Development (AGP-LMD), 2013). Farmers do not have access to all of the resources necessary to produce a product that meets market demand, and they frequently confront significant economic, social, and physical disadvantages (Getachew, 2015). Ethiopia's dairy industry has recently received new investment, processors, inputs, and farmer associations. However, inadequate market linkages on both the input and output markets pose a dilemma for producers and market actors (Muhammed, 2011).

According to Yilma *et al.* (2011), one of the major issues contributing to Ethiopia's dairy sector's poor development is insufficient links among the various actors in the dairy market chain. While the business sector is projected to respond positively to growing demand for dairy, small-scale household farms in the highlands contain the majority of the dairy development potential.

Unlike other regions of Ethiopia, the North Shewa zone, particularly the Grar Jarso district, is well recognized for dairy production, agro-ecology, and limited information about dairy production, processing, and marketing. Identification of persisting problems and understanding of the existing dairy production and marketing system in the area is crucial relevance to make future improvement actions.

1.2. Statement of the Problems

Enhancing market participation of households to benefit them from growing demand of dairy products is a better option that should be considered by policy makers since participation of producer in market supply is an essential strategy for poverty alleviation and ensuring food security in developing countries (Shapiro *et al.*, 2015).

Smallholder dairy farmers own and control around 98 percent of the milk in Ethiopia. Only 5% of the milk produced in the country is sold in commercial marketplaces, with the remaining 95% being consumed and processed at home (CSA, 2012). In 2011, around 6.55 percent, 36.58 percent, and 14.35 percent of total milk, butter, and cheese production on rural Ethiopia were sold in the market, respectively (CSA, 2011). Due to the high pressure of population expansion, demand for milk and milk products is higher in cities and supply is lower in rural areas.

Farmers do not have access to all factors that are needed for delivering a product that response to market demand and they often face strong economic, social and physical disadvantages (Getachew, 2015). Recently Ethiopia, dairy sector is getting new investment, processors, inputs and farmers' organizations. But, producers and market actors are challenged by the problem of weak market linkages on both input and output market (Muhammed, 2011).

Tadesse *et al.* (2015) investigated milk supply and marketing networks as well as losses in Ethiopia's Wolmera and Ejere districts, finding that around 9% of the total milk produced is lost every day across the milk supply chain. Milk handling practices at collection points, a lack of immediate buyer and long wait times at collection sites, milk carrying tools, modes of transportation used, and a lack of or ineffective communication with other partners in the chain were all identified as major causes of milk losses, in order of severity.

The major constraints to increasing the welfare of smallholders are their inability to access markets. Enhancing the ability of poor smallholder farmers to reach markets and actively engage in them is one of the most pressing development challenges.

In spite of dairy development potential of positive contributions to the economy North Shewa dairy sector is not well developed. The growing demand for processed dairy products is not being satisfied with the current production level by smallholder farmers or domestically.

To close the gap between the domestic demand and supply of dairy products, it is imperative to increase domestic production level. Dairy production level could be increase by improving the capacity of smallholder farmers and work on dairy development in general.

While policy makers favorably view development, meaning commercialization, of the dairy sector, it should be understood in the context of the contribution of livestock production to livelihoods and income generation for smallholder farmers through the production of higher value products compared to most crops.

Even if (Getachew. 2015, Mohamed. 2011, Tadesse, 2015) and others also conducted a research about marketing network of milk production in different areas with their own findings, their research have geographical, objective and methodological gaps. For instance they didn't give too much emphasis for low price vulnerabilities of milk producer households due to the absences of well-organized milk marketing outlets.

In particular, the study tries to investigate the major factors of milk production, challenges and opportunities in order to enhance the welfare of dairy producers. In order to design relevant dairy development strategy in the area, there is a need for smallholder farmers to be aware and to assess the existing dairy production. Assessment of existing dairy producers and identifying the challenges and opportunities for the success of the milk enterprises in the area is also crucial.

Moreover, the study tries to investigate milk product marketing, milk product and marketing channels and challenges and opportunity. The study is essential to provide vital and valid information on the operation and efficiency of dairy marketing and production system for effective planning and policy formulation.

This study therefore, conducted to contribute in filling the above listed gaps of dairy products by assessing the dairy production and factors that affecting supply of milk marketing in the Girar Jarso district.

1.3. Research Questions

- How the marketing channels are organized?
- What are the factors affecting the volume of milk supply by dairy household?
- What are the opportunities available and constraints to be solved for production and marketing of the milk in the study areas?

1.4. Objectives of the Study

The general objective of this study is to analyze milk market chain in Girar Jarso District.

1.4.1. Specific objectives

The specific objectives of the study are:

- To analyze milk marketing channels in the study area
- To identify factors affecting volume of milk market supply in the study area
- To analyze constraints and opportunities in milk market chain the study area

1.5. Significance of the Study

This study attempted to describe dairy production and marketing and identify determinants of dairy production, major constraints and prospects of dairy production and marketing. Besides, the study identify the factors that affect dairy production significantly which is an important input for designing appropriate intervention policy and strategies in order to satisfy the demand for dairy products. The study tries to generate valuable information on dairy marketing and production that would assist policymakers in designing appropriate policies for intervention. Governmental and nongovernmental organizations that are engaged in the development of livestock sub-sector would benefit from the results of this study.

The findings of this study are also believed to be useful to dairy producers, investors and marketing agents to make informed decisions. The work also serves as a reference document for researchers to embark on studies of the same or related kinds in other parts of the country. Therefore, it is hoped that, results from this study would have practical use mainly to this area and similar to other areas and can serve as a base for any further studies to be conducted in other areas in this line of study

1.6. Scope and Limitations of the Study

The study was conducted and restricted to Girar Jarso districts from a selected North shewa zone. It focuses on analysis of milk market chains. Besides, it was target only two dairy cooperatives, Fiche town dairy cooperative and Torbana Ashe dairy cooperative.

This research focused on small-scale dairy producers and dairy cooperatives from across all kebeles. The study focuses on this area in order to characterize the dairy production and marketing system as well as to identify factors, obstacles, and possibilities in the study area.

The researcher is limited only on the actual dairy producers which was supply milk in the market not the potential entrants to dairy production. The study does not investigate the specific preference for dairy products and the purchasing ability of the consumers' concerning to marketing system of dairy products. The researcher tries to identify only the major variables that affect milk production not every factor which possibly affect the dairy production

1.7. Organization of the Study

The thesis is organized into five chapters. In chapter two, review of theoretical and empirical works related to the study are presented. Chapter three discusses the research methodology used in the study. Results and discussions are presented in chapter four. Chapter five summarizes and concludes on the findings of the study and state recommendation based on the findings.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Definitions of basic term and concepts

Market can be referred to as when the products and/or services and their substituent's undergo exchanging process by one or more sellers through competition of a group of buyers for their patronage. A market can be also stated as a point where an operation of price making force and actual movement of ownership of goods takes place. Market can be viewed as a process by which the transformation of ownership of goods from sellers to buyers of a final consumers or intermediaries.

Marketing: is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging of offerings that have value for customers, clients, partners, and society at large" (American Marketing Association).

Marketing chain: is flow of commodities from producers to consumers that brings into place economic agents who perform complementary functions with the aim of satisfying both producers and consumers (Islam *et al.*, 2001). . A marketing chain may link both formal and informal market agents. A marketing chain may connect one or more milk or dairy sheds.

Marketing channel: Formally, a marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler *et al.*, 2003). This channel may be short or long depending on kind and quality of the product marketed, available marketing services, and prevailing social and physical environment (Islam *et al.*, 2001).

Market supply: Market supply refers to the amount actually taken to the markets irrespective of the need for home consumption and other requirements whereas market surplus is the residual with the producer after meeting the requirement of seed, payment in kind and consumption by peasant at source. Marketable surplus is the quantity of produce left out after meeting the farmer's consumption and utilization requirements for kind payments and other obligations such as gifts, donation, charity, etc. This marketable surplus shows the quantity available for sale in

the market. The marketed surplus shows the quantity actually sold after accounting for losses and retention by the farmers, if any and adding the previous stock left out for sale (Thakur *et al.*, 1997).

2.2. Theoretical Review

2.2.1. Dairy marketing channels and outlets

Marketing channel choice through which urban and peri-urban dairy producers sell their raw milk is a key decision area because, choosing a profitable channel requires a wise decision as it has a direct implication on the farm revenue and profitability (Dassou *et al.*, 2019). In addition, evidence shows that consumers in developing countries, including Ethiopia, are under emerging food system transformation with rapidly changing preferences and shopping habit (Tschirley *et al.*, 2014). Therefore, the informal milk marketing channel, that involves direct selling to consumers, may not continue to be a major option for selling milk and hence milk producers need to consider these facts and search for several alternative channels to sell milk.

Ethiopia offers an ideal case to study the choice of raw milk marketing channel along with the drivers behind these choices for a number of reasons. First, there is a missing marketing link between the formal milk processing companies, which are potential buyer of raw milk, and dairy producers in Ethiopia. Studies have shown that formal milk processing companies in Ethiopia are operating at less than half of their full capacity (Mulugeta *et al.*, 2019). On the other hand, dairy producers that operates in and around major cities in Ethiopia face milk marketing problems, especially during fasting periods resulting in low milk prices and high milk wastage (Adam *et al.*, 2019; Solomon *et al.*, 2016). Second, Ethiopia has the fifth largest cattle population in the world (FAO, 2020) yet a net importer of dairy products (Zelalem *et al.*, 2017), a paradox that makes understanding domestic marketing important. Third, the growing urbanization that creates high demand for milk needs to be understood for the urban and peri-urban dairy producers' milk marketing channel choice decision in Ethiopia. Marketing outlet is the final market place to deliver the milk product, where it may pass through various channels. A network (combination) of market channels gives rise to the market chain.

2.2. 2. The role of milk in Ethiopian Economy

The Ministry of Finance and Economic Development (MOFED) estimated the gross value of ruminant livestock production in 2008/09 at Birr 32.64 billion; of this, Birr 19.471 billion (59.65%) obtained from milk and milk products (Behnke and Fitaweke, 2011). After one year, the recalculation of values by these authors showed the livestock contributions to the economy is at Birr 48.07 billion, (an increase of 47% from MOFED estimates) during the same year. This figure does not include the value of animal traction. Of this (48.07 billion), milk and milk products contributes 63.49% (30.52 billion Ethiopian Birr) to gross value of ruminant livestock production. This indicates that the government of Ethiopia has been underestimating the contribution of livestock especially the share of milk to the agricultural gross domestic product of the country.

2.2.3. Milk Production systems in Ethiopia

According to Land O'Lakes (2010), Ethiopia's milk production systems can be broken down into four main systems as described in detail below.

1. Commercial production system

This production system mainly keeps pure or cross bred cattle with a better usage of artificial insemination of improved semen and record keeping. In this system, a majority of the pure or cross bred animals are owned by commercial farms. The output per cow can range from 1120 – 2500 liters of milk per lactation. These producers would be willing to pay for the more expensive imported breeds (SNV, 2008).

2. Rural smallholder production system

The Ethiopian highland smallholder farmers owned about 75% of the country livestock population using their cattle as a main source of milk production, traction power and manure as a fertilizer on crop land or for household fuel. In the rural highland areas of Ethiopia, producers keep mostly zebu cattle which have lower milk production performance but better suited to resist disease and poor management conditions. The sources of feed are communal grazing pastures and crop residues. The possibility of in-breeding is more expected since producers do not

practice breeding record keepings. The rural small-holder production system produces the largest share of total milk produced in the country, contributing about 98% of the milk production (CSA, 2015). Small-holder producers' sell their milk and milk products to urban areas when they get market access and affordable transportation. Producers process their milk to butter or yogurt (fermented milk) and consume in their home or sell to their neighbors or in the market.

3. Urban and per-urban milk production system

In this system, producers would have a better understanding of dairy management and have improved breeds with greater interest of using artificial insemination services. The milk producers have relatively better awareness and accomplish their activities targeting to sell their dairy products for the nearby town and city consumer. They also sell their milk to processors. The preferred cross-bred cow has about 50 – 62.5% or above improved genetic makeup. Because of the scarcity of land, cattle are maintained under confined systems where feed source is mostly agro-industrial by-products such as oil seed cakes, wheat bran, etc) and purchased roughage and feed by cut and carry system (Ali, 2017) .

4. Pastoral and agro-pastoral

This type of production system is mainly depends on natural pasture located on non-arable rain-fed lands for their livestock keeping and milk production. The seasonal movements by the majority of animal stock in seek of water and feed resource is their main character. When animals are close to home, crop residues (sorghum and maize thinning and Stover) are important feed resources for livestock especially for those of agro pastoral (Land O'Lakes, 2010).

2.2.4. Milk marketing systems in Ethiopia

As is common in other African countries (e.g., Kenya and Uganda), dairy products in Ethiopia are channeled to consumers through both formal and informal dairy marketing systems (Mohammed *et al.*, 2004). Until 1991, the formal market of cold chain, pasteurized milk was exclusively dominated by the DDE (Dairy development Enterprises) which supplied 12 percent of the total fresh milk in the Addis Ababa area (Holloway *et al.*, 2000). The DDE remains the only government enterprise involved in processing and marketing dairy products. The DDE collects milk for processing from different sources, including large commercial farms and

collection centers that receive milk from smallholder producers. The enterprise operates 25 collection centers located around Addis Ababa, 13 of them near Selale, 5 near Holetta and 7 around Debre Brehane (Mohammed *et al.*, 2004). Unlike the early phases, the formal market appears to be expanding during the last decade with the private sector entering the dairy processing industry. Private businesses have begun collecting, processing, packing and distributing milk and other dairy products. However, the proportion of total production being marketed through the formal markets remains small (Muriuki and Thorpe, 2001). Formal milk markets are particularly limited to Peri-urban areas and to Addis Ababa. However, since its inception, the enterprise has only utilized its full capacity during the four-year period from 1987 to 1990 (Staal, 1995). The reasons for low capacity utilization include management problems, financial difficulties, and unstable and low consumption levels of processed milk in the society due to fasting that prohibits the orthodox Christians (about 35- 40 percent of the population) from consuming dairy products for almost 200 days every year (Yigezu, 2000).

The informal market involves direct delivery of fresh milk by producers to consumer in the immediate neighborhood and sale to itinerant traders or individuals in nearby towns. In the informal market, milk may pass from producers to consumers directly or it may pass through two or more market agents. The informal system is characterized by no licensing requirement to operate, low cost of operations, high producer price compared to formal market and no regulation of operations. The relative share and growth of the formal and informal market in the three phases was different. In all three phases, the informal (traditional) market has remained dominant in Ethiopia (Redda, 2001). The traditional processing and trade of dairy products, especially traditional soured butter, dominate the Ethiopian dairy sector. Of the total milk produced, only 5 percent is marketed as liquid milk due to underdevelopment of infrastructures in rural areas.

2.2.5. Factors affecting milk production and marketing

The research carried out by FAO (2008) the frequently reported constraints by farmers are poor animal genetic potential(92%), Low milk supply (88%) and of animal feed (83%).

Van der Valk and Tessema (2010) reported that highly fluctuating demand because of long fasting days, seasonal fluctuation in supply of quality milk and fragmented market at supply side

effects milk production, In addition to this negative consumers perception of product quality and hygiene of industrial dairy products, absence of minimum standard set by dairy industry are the main constraints milk production and marketing of Ethiopian country. These affect smallholder milk production potential of the country. More over a higher level on expenditure on feeds does not always result in more milk of a higher quality if the feed quality is low.

2.2.6. Constraints and opportunities of the dairy sector

1. Constraints to the dairy sector

In Ethiopia, the livestock sector in general and the dairy sub-sector in particular do not make a considerable involvement to the national income, in the face of their large size, as a result of varies socio-environmental constraints. Challenges and problems for dairying diverge from one production method to another, from one location to another, in different ecological zones and management levels. This sector faces different challenges like technical (health problems, reproductive problems), institutional (inadequate extension and training services), policy and socio-economic challenges (environmental problems and marketing linkage problems). This challenge lowers the production and reproduction efficiency of dairy cattle in Ethiopia (Tadesse and Mengistie, 2016).

Dairy production in Ethiopia is inhibited by several factors these factors can be environmental like, low rainfall, high temperature and low forage production, occurrence of main livestock diseases and parasites, technical, biological, socioeconomic and institutional sources, mainly found in the lowlands of Ethiopia (Matawork, 2016).

2. Opportunities to the dairy sector

Ethiopia has gifted with large and diverse dairy animal genetic resources. The country is considered as a center of diversity for animal genetic resources. Indigenous animals have advanced over time through natural selection and adaptation to the existing diverse ecological conditions of their habitat. The potential of indigenous dairy animals has not been fully explored. There are signs that milk yield among the indigenous animals is variable indicating that there are opportunities for upgrading (Dagris, 2007).

There is large potential for dairy growth in Ethiopia due to its huge livestock population, favorable climate, high-yielding animal breeds, emerging market opportunity and improved policy environment for participation of private sectors (Matawork, 2016). Dairy farming in Ethiopia have different opportunities such as, the existence of high livestock genetic resources and different production methods, availability of different services and land inputs, availability of huge labor force, the presence of indigenous knowledge, Tadesse and Mengistie (2016). Increasing demand for dairy products in urban and pre-urban areas, established culture of dairy products consumption, and satisfactory policy are indicators of the significance and potential of dairying in Ethiopia, (Tegegn *et al*, 2013).

2.3. Review of empirical studies

2.3.1. Status of Milk production and Consumption in Ethiopia

Although Ethiopia has the largest cattle population in Africa, at 52 million, and of these 10.5 million dairy cattle, the yearly milk production is very low with low per capita annual milk consumption (19 liters) which is by far below the African average (40 liters) as well as the world average (105 liters) (FAO, 2011).

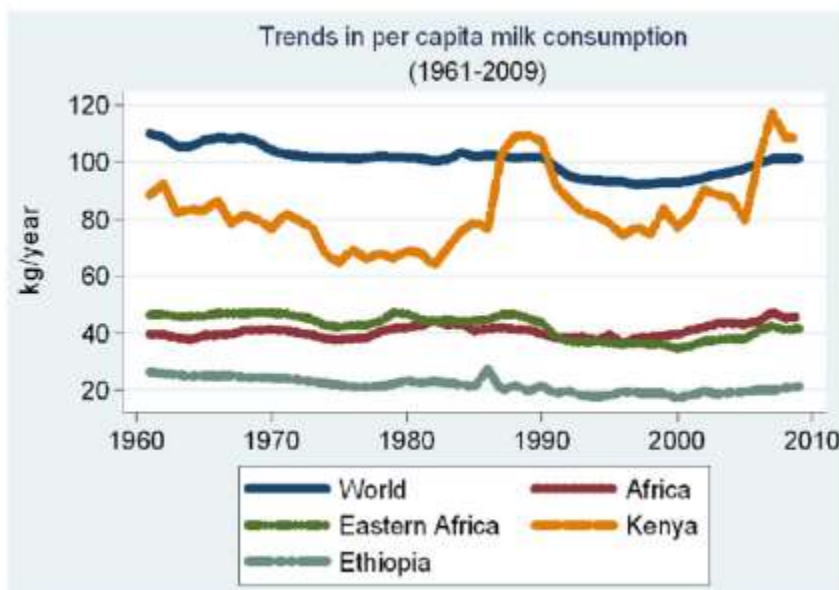


Figure 1: International milk consumption trend

Source: FAO (2011)

Referring data from CSA, AGP (2013) described that Ethiopian milk production has increased significantly since 2000 indicating that national milk production was 1.2 billion liters in 2000, 3.2 billion liters in 2007, and 3.3 billion liters in 2012.

2.3.2. Determinants of the volume milk market participation

A study conducted by Berhanu (2012) using probit model indicate that the household size, presence of at least a child in a house, landholding size and distance to the nearest urban market showed an inverse relationship whereas milk yield per day in liter showed a direct relationship with the probability of milk sales decision by milk producers. Another study conducted by Berehanu (2014) using the Heckman first stage model found that owning a milking cow influenced the probability of milk producers selling their milk, whereas age of the household and dairying experience influenced the probability of milk producers selling their milk negatively.

According to a study conducted by (Bedilu *et al.* 2014) using the Heckman model to determine the determinants of camel and cow milk marketed surplus, the number of milking cows and access to milk market information had a positive impact on both milk sale volume and milk market participation decisions of milk producers. Access to extension services, the number of milking cows, access to milk market information, and the market price of cow milk, according to these authors, all had a favorable impact on the volume of milk delivered to the market by milk producer households.

Bultossa (2016) conducted research in Bako Tibe district, west showa zone, with the goal of identifying factors influencing small-holder dairy farmers' market participation. The data was analyzed using the Logit model. The results reveal that family size, extension service, distance to the nearest market, and the number of milking cows owned all have a substantial impact on dairy market participation. The findings suggest that production and marketing be improved by introducing new technology and providing suitable marketing infrastructure, such as roads and transportation. Appropriate marketing links should be formed through institutional arrangements, such as dairy cooperatives and milking groups, in order to reduce transaction costs. The use of flexible criteria in acquiring bank and micro loans, as well as the establishment of a well-functioning financial system, will encourage resource-poor farm households to engage in the dairy market.

According to Hilemariam (2016), conducting research in Ethiopia's central highlands on the goal of crossbreeding adoption and milk and milk product market involvement. The probit model is used to examine the data. The empirical data suggest a link between technology adoption and market involvement decisions. He also discovered that if the milk collection station is close to the milk producers, milk marketing involvement is high. Farmers who are located distant from collection locations sell milk products such as butter and cheese rather than raw milk.

Gemechu et al. (2021) investigated the factors that influence small-scale farmers' decision to engage in the milk market in Ada'A Berga district, West Shewa zone. The 123 respondents were chosen using a multi-stage sampling process. The data is analyzed using the Heckman two-stage model by the authors. Breed type, dairy revenue, dairy cooperative membership, and milking cows all had a positive and statistically significant effect on milk market participation, according to the Heckman first stage results. Education, the number of milking cows, credit, and membership in a dairy cooperative all has a positive and statistically significant effect on milk market participation in the second stage Heckman model.

2.3.3 Constraints of dairy production and marketing in Ethiopia

Study conducted to (Azage *et al* 2008) Challenges and problems for dairying vary from one production system to another and/or from one location to another. The structure and performance of livestock and its products marketing both for domestic consumption and for export is generally perceived poor in Ethiopia. Underdevelopment and lack of market-oriented production, lack of adequate information on livestock resources, inadequate permanent trade routes and other facilities like feeds, water, holding grounds, lack or non-provision of transport, ineffectiveness and inadequate infrastructural and institutional set-ups, prevalence of diseases, illegal trade and inadequate market information (internal and external) are generally mentioned as some of the major reasons for the poor performance of this sector.

Studies conducted to (Getachew *et al* 2016) identify the key opportunities and constraints of dairy production and marketing on 110 smallholder dairy producers in Laelay Maichew District, Central Zone of Tigray, Ethiopia. Ranking Analysis Index has been applied for this research for the purpose of to identify constraints of milk production and marketing. The milk production and marketing was constrained by various challenges. Based on their survey result producers are

suffering from lack of marketing, lack of supplementary feed, water scarcity, low breed milk productivity and shortage of grazing land. Despite the numerous challenges the dairy production still remains profitable business for the smallholders.

2.4. Conceptual framework

The conceptual framework was to analyse milk market chain in the case of Girar-jarso. The conceptual framework is based on the previous work of market chain analysis and determinants of volume of milk supply is integrating farmers into the inputs and output markets to increase production, earnings and decrease poverty (Otekunrin *et al.*, 2019). Smallholder farmers produce dairy to fulfill his/her physiological wishes of feeding, and/or to collect extra wealth through commercializing his activities and make certain decisions about what kind of dairy(s) to produce, how much to be produced, when and where to actually sell or market the produce which would result into most satisfaction from their labour in terms of returns.

Factor affecting the volume of milk supply

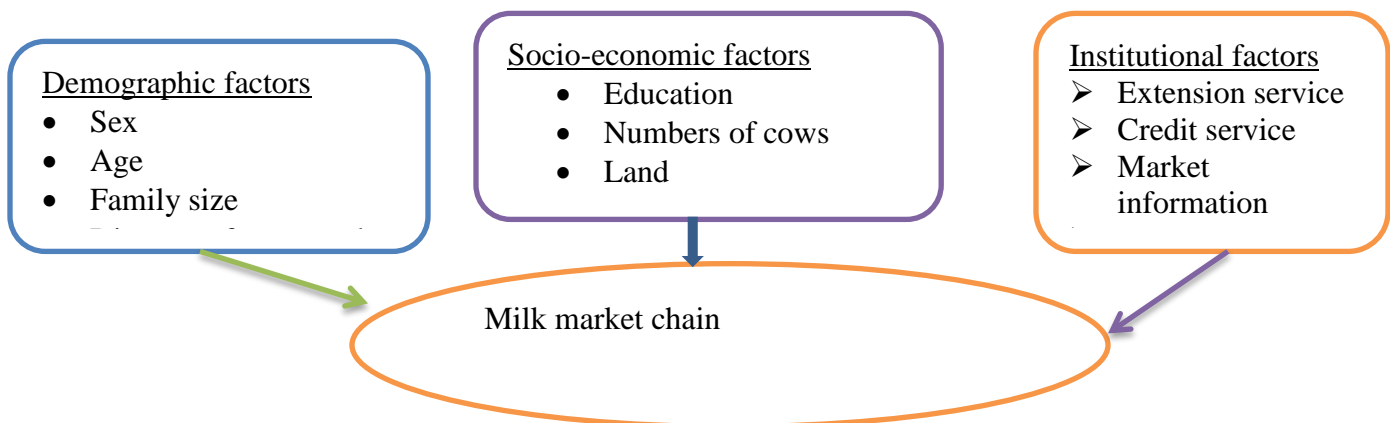


Figure 2: conceptual framework of the study

2.5. Summary of related literature and research gap

Different studies have carried out on the concept of dairy marketing and production to address factors affecting on dairy production and marketing and to identify challenges and opportunities of dairy marketing in Ethiopia. This includes (Berhanu, 2012) and (Hilemaraim, 2016) using probit model, (Bulutosa, 2016) using logit model, and (Bedilu *et al*, 2014) and (Birhanu, 2014) using Heckman model thus authors analysis milk market participation decision and level of participation in Ethiopia. (Azege *et al*, 2008) identify key constraints and problems of dairy marketing and production in Ethiopia. And also (Getachew *et al*, 2016) identify constraints and opportunities of dairy marketing in Ethiopia.

One of the main objectives of this study was to identify factors affecting smallholder farmer in the volume of milk market supply. Different researchers have used different econometric models to identify the determinants of smallholder market participation decision and level of participation. For instance, the researcher used multiple liner regression models to analysis the gap.

Several studies have been performed on dairy production and marketing in Ethiopia. Understanding of household behaviors' in milk marketing can better inform policy. Therefore, this study attempted to empirically analysis of factors affecting of smallholder farmer's to supply milk market and identify constraints and opportunities of milk production and marketing in the Girar Jarso district, Ethiopia.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

This study will be conducted in Gerar jarso District, North Shewa Zone of Oromia National Regional State, Ethiopia. District borders with the south by Yaya Gulale and Debre Libanos, on the west by Degem, and on the east by the Amhara Region. The total area coverage's of the district 42,763 hector and about 59% used for crop production. Gerare jarso district has three main agro-climatic regions can be identified as daga (52%), woina daga (41%) and kola (7%) areas. The maximum and minimum temperature of the District is 25 to 10 ⁰C, respectively and receives annual rain fall ranging from 917 to 1443 mm. The rain is bi-modal with short rainy season from February to March and long rainy season from June to September.

The district is characterized by crop-livestock mixed farming system where livestock in general and milk production in particular contribute significantly to farmer livelihoods used for income. Farmers keep a significant number of livestock (cattle, sheep, donkey and horse) for various purposes in the study area. Local cattle are the predominant breeds in the study area and market oriented dairy production based on local dairy cows is also practiced. Crops widely produced in the area include barely, wheat, *teff*, oat, bean, cow pea, field pea, haricot bean and maize.

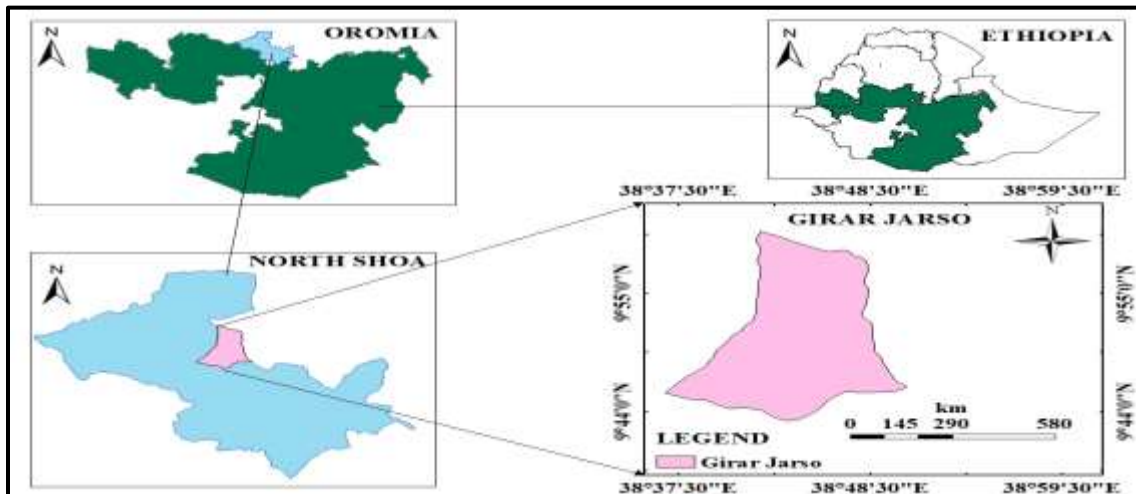


Figure 3: Map of the study area

Source: From Research Gate Nate: Created Through Arc GIs Version (10.4)

3.2. Research Approach

There are three types of research approaches; qualitative, quantitative and mixed approach. Quantitative method is a means for testing objective theories by examining the relationship among variables. Data collected is expressed numerically and statistically. On the other hand, Qualitative research is best suited to address a research problem in which we do not know the variables and need to explore. The literature might yield little information about the phenomenon of study, and we need to learn more from participants through exploration.

The approach followed for this research proposal is a mixed research approach; both qualitative and quantitative methods are used to minimize limitations attached to each of the approaches. The mixed method focuses on collecting, analyzing and interpreting of both quantitative and qualitative data in a single study or series of studies. According to (Creswell, 2012) qualitative research, seek to explore a central phenomenon and engage in an emerging process of research. As the main objective of this study is to analysis milk market chain in Gar Jarso district mixed approaches are found to be best suited.

3.3. Research Design and Target population

As the research approach was monitored for this research proposal is a mixed research approach, the research designs followed for the research were descriptive and explanatory research designs. The purpose of descriptive research design is to describe the result and finding of the study. It is relevant that it enable the researcher to gather data form single population. Descriptive research focuses on explaining the characteristics of a particular individual, group or situation. Saundrset.al (2007) also says the objective of descriptive research is describing an accurate profile of a person, events or situations.

This research has applied explanatory type of research since it attempts to describe the relationship between independent variables (such as education, access to extension service, access to credit, members of cooperative, age, sex of house hold, distance to market, experience to dairy production, access to market information and milk collection center and dependent variable (the volume of milk market supply). Thus, the objective and nature of this research relevantly fall under descriptive and explanatory research design.

The population of the study covers Girar Jarso districts were selected purposively because of potential in dairy production in North Shewa Zone. The target populations of the study were also covers all actors participating starting from milk production to final consumers.

3.4. Methods and Types of Data Collection

Quantitative and qualitative data was collected from both primary and secondary data source. Primary data was collected from the smallholder farmers from three sampled selected *kebeles*. An informal survey technique was used for key informant interview. The formal survey was undertaken through semi structured questioner with randomly selected farmers. Key informants were interviewed from different organizations and institutions. Secondary data were obtained from different sources, such as reports of animal production and health, marketing agency, agricultural office at different levels, district cooperative promotion offices and dairy cooperative union. Other sources of secondary data are previous research findings, journals, books, websites and other published and unpublished materials, which are relevant to the study.

The enumerators employed to conduct the questioner were to be college diploma holders they are familiar with the culture and language (both Amharic and Afan Oromo) of the community. Appropriate training, including field practice, was given to the enumerators to develop their understanding regarding the objectives of the study, content of the questionnaire and how to approach the respondents to conduct or get the relevant data. The questionnaire was pre-tested using non-sample respondents before actual data collection and amendments make to capture important data that necessary for the analysis.

3.5. Sampling Techniques and Sample Size Determination

Sampling technique

Multistage sampling techniques were used to draw sample farmers'. At the first stage, with the consultation of zone livestock development experts' Girar Jarso, districts were purposively selected based on milk production potential in the zone. In the second stage purposively selected two well organized dairy cooperatives namely (Torbana Ashe dairy cooperative and Fitch town dairy cooperative).

In the third stage, sample farmers in each sample dairy cooperative member were selected randomly. The total samples were distributed to each sample kebeles based on the probability proportional to size sampling technique. The sample size was determined by using Yamane (1967) formula.

Table 1: Total sample size of the study

Name of dairy cooperative	Total Household Size	Sample Size
Fitche town dairy cooperative	114	75
Torbana Ashe dairy cooperative	86	57
Total	200	132

Source: Befitu Salale dairy cooperative, 2022

Sample Size Determination

For this research study Yamane (1969) formula was applied to determine the total sample size of the study at 95% confidence level and 5% level of precision.

The formula used for total sample size determination was as follows;

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

Where:

n = Total Sample size for the research use

N =Total household size of target population (total number of households who is members of dairy cooperative N=200)

e = Level of precision (=0.05).

$$n = \frac{200}{1 + 200(0.05)^2} = 132 \text{ HHs} = \text{Total Sample Size.}$$

Using probability proportional to size sampling technique, the sample size for each dairy cooperative was calculated as follows:

$$\text{Sample size for Fitch town dairy cooperative} \quad n_1 = \frac{114 \times 132}{200} = 75 \text{ HHs}$$

$$\text{Sample size for Turban Ashe dairy cooperative} \quad n_2 = \frac{86 \times 132}{200} = 57 \text{ HHs}$$

$$\text{Total Sample Size (n)} = n_1 + n_2 = 75 \text{ HHs} + 57 \text{ HHs} = \underline{132 \text{ HHs}}$$

3.6. Methods of Data Analysis

Two types of data analysis, namely descriptive statistics and econometric model were used to analyze the data collected from milk producers and traders of the study areas.

3.6.1. Descriptive statistics

Statistical Package for Social Science (SPSS) Version 20 was used to analyze the Dairy production and marketing data and to prioritize challenges and prospects of it. This method of data analysis refers to the use of ratios, percentages, means, and standard deviations.

3.6.2. Econometric analysis

We used the multiple linear regression model of OLS (ordinary least square) estimation. Because the dependent variable is a continuous variable and the independent variable either continuous variable or dummy variables. It was an essential method of econometric analysis to recognize and realize patterns of the influencing factors. It should be noted that in the course of analyzing the factors affecting volume of milk market supply, which is the main objective of this study, it was important to first identify factors underlying the milk market chain and examine the magnitude and significance of these factors. The econometric analysis for the Ordinary least square estimation procedures was performed using STATA version 15.

Regression Functions

In order to analyze factor affecting the volume of milk market supply. It uses the equation of regressions on this study is generally built around two sets of variables, namely dependent

variable (volume of milk supply) and independent variables (education level, sex of house hold, family size, age, Access to market information, access to institutional credit, access to extension service, number of cross breed cow own, dairy production experience. The basic objective of using regression equation on this study was to make the study more effective at describing, understanding and predicting the stated variables.

Regress the volume of milk supply

The general linear regression model with k explanatory variables is written in the form:

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

Where: Y_i is response or dependent variable

X_1 . sex of household

X_2 - education level

X_3 - access to market information

X_4 – access credit

X_5 – access to extension service

X_6 , - milk production experience

X_7 - family size

X_8 - age of household

X_9 numbers of cross breed cows own

X_{10} . number of local breed cows own

u_i -**error term**

β_0 is the intercept term- constant which would be equal to the mean if all slope coefficients are 0.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$, and β_8 are the coefficients associated with each independent variable which measures the change in the mean value of Y, per unit change in their respective independent variables.

To detect problem of multicollinearity among variables, Variance inflation factor (VIF) and Contingency coefficient (CC) was used. According to Gujarati (2003), multicollinearity refers to a condition where it becomes difficult to identify separate effect of explanatory variables on dependent variable due to the existence of strong correlation among them. VIF used to test multicollinearity among continuous variables whereas contingency coefficient (CC) used to test

multicollinearity between dummy independent variables. As a rule of thumb, If the value of VIF is greater than 10 (this will happen if R² is greater than 0.91) and if the Value of CC greater than 0.75, then the variables are said to be collinear (Gujarati, 2003) and VIF for continuous variables computed as follow:

$$VIF (X_i) = (1-R_j^2)^{-1}$$

Where, R_j² is the squared multiple correlation coefficients between independent variables, the larger the value of R_j², the higher the value of VIF (X_i) causing severe collinearity problem in X_i. The value of CC ranges between 0 and 1 and 0 indicates no association between the variables and the value close to 1 indicates a high degree of association between variables.

$$CC = \sqrt{\frac{\chi^2}{N + \chi^2}}$$

Where, CC is contingency coefficient, χ^2 is chi-square test and N is total sample size.

3.7. Variable Definition and Hypothesis

Dependent variable:

Volume of Milk Supply (VMS): It is continuous dependent variable which is measured in liter and represents the average volume of milk supply per day to market outlets.

Independent variables: The following independent variables were hypothesized to influence the participation in milk marketing of producers.

Sex of the household head (SEX): is a dummy variable representing one if a household is male and zero female and assumed to influence the households in milk market supply. Male households were expected to be more favored to get dairy input than females. Therefore, in this study, being male household head was expected to affect positively the smallholder milk producer households' for the level of milk market supply. The study of Meryem(2013) showed that being male household head affected positively the likelihood and level of participation in milk market while Tadele *et al.* (2014) indicated that being male head of a household was found to affect positively both the likelihood of participation in milk value addition and volume of milk value added.

Age of the household head (AGE): Is a continuous variable measured in year and hypothesized to have a positive relationship with the volume of milk market supply. As the age of milk producer household increases, their likelihood to be wise in milk business also increases. Tadele *et al.* (2014) stated that age of the household head explained positively the smallholder milk producer households' decision of participation and level of participation in milk value addition practices. Therefore, in this study, age of the household was hypothesized to influence positively.

Education level of the household head (EDLHH): It is continuous variable and is measured in years of formal schooling of the household head. Education plays an important role in the adoption of innovations/new technologies. Further, education is believed to improve the readiness of the household to accept new idea and innovations, to maximize dairy production and get updated demand and supply price information which in turn enhances producers' willingness to produce more and increase milk market entry decision and volume of sale. Therefore, in this specific study, formal education is hypothesized to affect dairy production positively.

Family size (FSHH): It is a continuous variable and measured in adult equivalent. As dairying is labor intensive activities, dairy production in general and marketable surplus of dairy products in particular is a function of labor. Accordingly, families with more household members tend to have more labor which in turn increase milk production and then milk market participation of the dairy household. In the same way, the variable is assumed to have positive impact on level of milk market participation of the sampled dairy household.

Experience in milk production (ExMP): is a continuous variable measured in years and assumed to influence positively the level of participation of milk producer households in milk market supply. This assumption is based on the fact that when the experience of a farmer in dairy production increases, the skill to perform milk business in a better way also increases. The study of Kumar (2010) indicated that experience of dairy farm has been found to influence positively the producers' participation and intensity of participation in milk market supply.

Access to credit (ACCR): Access to credit is measured as a dummy variable taking a value of one if the household has access to credit and zero otherwise. This variable is expected to influence the marketable supply of milk and milk market entry decision by dairy household

positively on the assumption that access to credit improves the financial capacity of dairy households to buy more improved dairy cows, thereby increasing milk production.

Access to Dairy production Extension service (ADPE): This variable is measured as a dummy variable taking a value of one if the dairy household has access to dairy production extension service and zero otherwise. It is expected that extension service widens the household's knowledge with regard to the use of improved dairy production technologies and has positive impact on milk market sale volume of milk. Number of extension visits improves the household's intellectual capitals, which improves dairy production and divert dairy production resources. According to Adugna (2009), the aim of the extension service is to introduce farmers with new and improved agricultural inputs for better methods of increasing production and productivity in turn that increase marketable supply.

Access to marketing information (AMI): is a dummy variable taking the value of one if a household had access to market information and zero otherwise. Having good communication with milk traders can provide access to market information. Berhanu (2012), Meryem (2013) and Bedilu *et al.* (2014) found that access to market information showed positive relationship with the volume of milk market supply.

Number of Cross breed milking cows (NCBMC): it is a continuous variable and measured in number. Total production of milk assumed to be positively influenced by the number of milking cows owned. Breeds of milk cattle show obvious differences in their milk composition and yield.

Number of local breed milking cows owned (NLBMC): is a continuous variable measured in number and hypothesized to have positive influence intensity of smallholder milk producers' participation in milk market supply. Meryem (2013) found that number of local breed milking cows owned affected positively the probability and intensity of milk producer households' participation in milk market supply.

Table 2: Hypothesis of variables used in milk market chain

Variable	Description	Types of variable	Measurement	Expected sign
Dependent variable				
1.VMS	Volume of milk supply	Continuous	In litter	
Dependent variable				
SEX	Sex of HH head	Dummy	1 for male, 0 otherwise	+ve
AGE	Age of HH head	Continuous	In year	+ve
EDLHH	Education level of HH	Continuous	School of year finishes	+ve
FSHH	Family size of HH head	Continuous	Adult equivalent	+ve
EXMP	Experience in milk production	Continuous	Year of dairy production	+ve
ACCR	Access to credit service	Dummy	1 HH has access to credit and 0 otherwise	+ve
ADPE	Access to dairy production extension service	Dummy	1 HH has access to dairy production ss. 0 otherwise	+ve
AMI	Access to market information	Dummy	1 HH has access to market information. 0 otherwise	+ve
NCBMC	Number of cross breed milking caw	Continuous	Number of caws owned	+ve
NLBMC	Number of local breed milking cows	Continuous	Number of cows owned	+ve

CHAPTER FOUR

4. RESULTS AND DISCUSSION

This chapter presents the results of descriptive and econometric analysis of the study. The descriptive analysis employed to describe the general characteristics of sampled smallholder milk producers. The econometric analysis employed to identify factors that affect smallholder milk sale volume of the sampled smallholder farmer's household in North Shewa zone of Oromia regional state. Milk was chosen for this study because it was the most important households' income source and the study area is potential for milk product

4.1. The Results of Descriptive Analysis

4.1.1. Demographic and socioeconomic characteristics of the sample households

Out of the sample dairy cattle producers, 69.7 % were male headed and 30.3% female headed households (Table1). This shows males are more involved in dairy production than female this might be as a result of males are risk takers in making a business, getting better opportunity, independent financially and having power to make a decision than females.

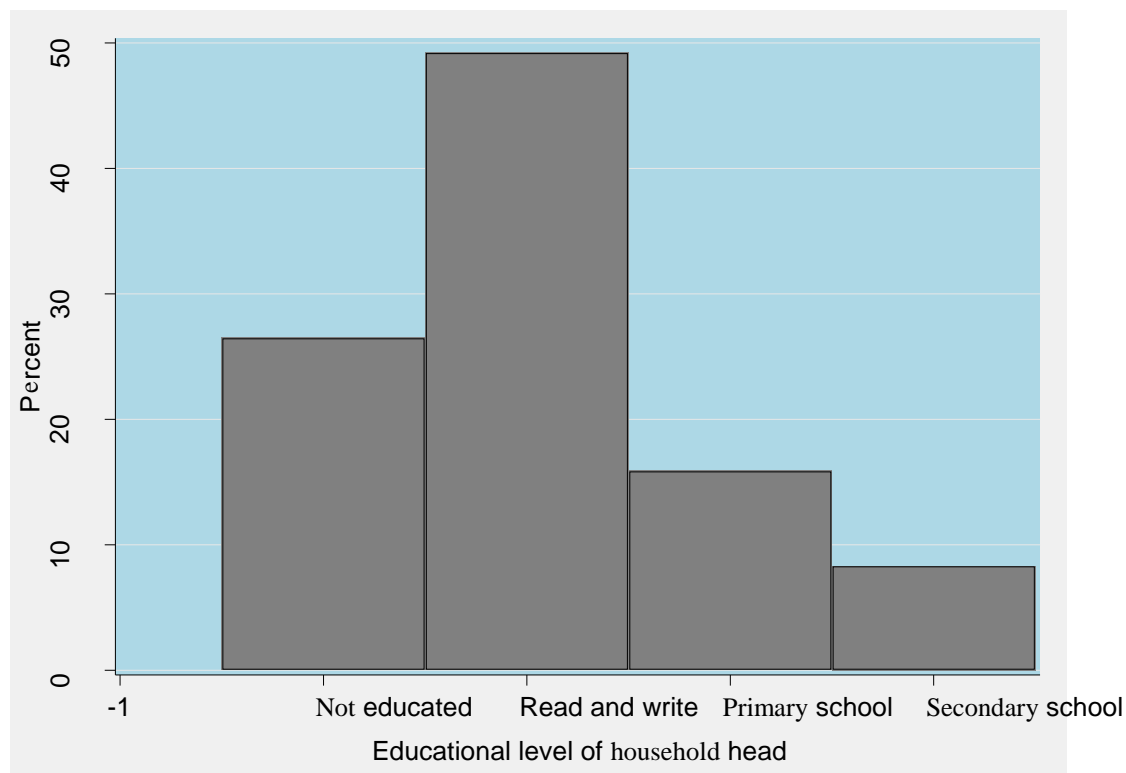
The age of the respondents were between 20-39 (43.94%), 40-59 (40.15%), and above 60 (15.91%). The average age of the respondents was between 39 years. This indicates majority of dairy producers are in the age of 39 years, these age could be productive in dairy farming.

Table 3: socio- economic behavior of respondents

Variables	Groups	Frequency	Percent
Sex of HHs	Male	92	69.7
	Female	40	30.3
	Total	132	100
Age of HHs	20-39	58	43.94
	40-59	53	40.15
	>60	21	15.91

Source: own survey result, 2022

With respect to educational status of the household head, the majority of dairy producers was read and writes only (Table 2). The overall proportion of not educated dairy producer was 26.52%, about 49.24% are in a category of read and write only, 15.91%, 8.33 are primary school and secondary school respectively. Education is an important entry point for empowerment of dairy farm producers and an instrument to sustain development, the Ordinary least square (OLS) regression technique (see table 7) shows that education has positive and significant impact on dairy production. The study results in general indicate those dairy cattle owners are mainly those who are able to read and write, primary and secondary school; these indicate that when the household head more educated they became willing in involving in dairy production and more productive as a result of adoption of technologies in feed preparation, milk handling, animal health care, and marketing system and dairy management in general. The role of education is obvious in affecting household income, adopting technologies, demography, health, and as a whole the socio-economic status of the family as well. This result supported by Nardos (2010)



Source: own survey result 2022.

Figure 4: Educational level of household heads

According to the survey result indicates in table 4, the mean family size of the respondent was 3.5. And the t test shows there was no statistically significant difference between two groups of male and female milk market supply. The mean age of milk producers were 39.07 years and had statistically significance difference at less than 1% probability level between two groups of milk market supply.

Farther more the mean experience years in milk production of milk market were 7.58 years. Table 4 show that the t-test and estimated of OLS model shows that milk producer experience was statically significant at less than 1% probability level.it seem that experience of milk producers increase the volume of milk supply becomes increase. The mean educational level of sample household was 3.08 years and there was significant difference at less than 1% probability level between male and female households of milk market supply.

Table 4: socio-demographic depiction of sample households by continuous variables

Variables	Total (N=132) Mean	Sex of household head male (N=92) & female (N=40)	Mean	Standard deviation	t value
Age of HH head	39.07	Male	41.11	9.40	4.38***
		Female	34.15	5.37	
Family size of HHs	3.50	Male	3.46	1.09	-0.75
		Female	3.61	1.06	
Educational status	3.08	Male	3.95	3.33	5.13***
		Female	1.07	1.83	
Experience in milk production	7.58	Male	8.44	4.08	3.96***
		Female	5.60	2.98	

Source: own survey result, 2022

*** Significant at 1% significant level

4.1.2. Access to different support services/enabling factors

Table 5 depicts that access to credit, extension and market information which are the most important factors that promote agricultural production and productivities thereby increasing marketable surplus and ultimately farm income.

The findings indicated that 32.58% of milk market supplies were male and 3.79% of female respondent have got access to credit with 1% statistically significant difference between male and female respondents of milk market supply.

According to the survey results indicated in table 5, 41.67% of sample households have got access to market information while 58.33% have not got. Out of 41.67% of sample households who accessed market information, all of them were milk market supply households of male and female respondents were accessed market information. The chi-square test indicated that access to market information affected positively and significantly the small holder milk producers' in milk market supply at 5% significance level.

The analysis also showed that 58.33% of milk market supply households have got access to extension service while 41.67% of milk market supply producers have no access to extension service, and the chi-square test showed there was statistical significance difference at 1% significance level between the two groups of milk market supply male and female respondents.

Table 5: Access to different supporting service/ enabling factor

Variables		Male =92 In (%)	Female =40 In (%)	Total level % N=(132)	Chi square test
Access to credit	Yes	32.58	3.79	36.36	14.123***
	No	37.12	26.53	63.64	
	Total			100	
Access to extension service	Yes	51.52	6.82	58.33	30.319***
	No	18.18	23.48	41.67	
	Total			100	
Access to market information	Yes	34.09	7.58	41.67	6.55**
	No	35.61	22.73	58.34	
	Total			100	

Source: own survey result 2022.

*** Significant at 1% ** significant at 5%

4.1.3. Milk production and Lactation Period

The average total milk yields per household per day were 29.74 liters of milk market supply. Based on the results indicated in table 6, the mean value of total milking production per household has less than 1% significant level. This implies that milk yield per household per day affected significantly the milk producer households in milk market supply.

The average holdings of local breed milking cows per household were 0.23 cows. The mean value of holding local breed milking cows per household had no statistically significant households of milk market supply. On the other hand, the average holdings of cross breed milking cows per household were 2.78 cows. The mean value of holding cross breed milking cows per household had less than 1% significance households of milk market supply. Which indicates the number of cross breed milking cows affected milk producer households in milk market supply.

The average lactation lengths of local and breed milking cows per calving were 4.5 months which has no statistically significant in the volume of milk market supply. The lactation period of cross breed milking cows were 9.41 months. As the survey indicated lactation period for cross breed cows had no statistically significant in milk producing households less than 5% significant level.

Table 6: milk production, lactation period and number of cows owned

Variables	Mean value	Standard deviation	t value
Number of cross breed cow	1.7879	1.05592	4.083***
Number of local breed cow	.2348	.46000	-1.462
Cross breed lactation period	9.4167	1.11233	2.549**
Local breed lactation period	4.4848	.74634	-1.170
Volume of milk produced per day per household (litter.)	29.7424	11.72498	5.987***

Source: own survey result, 2022

The value ***, ** & * represents statistical significance level at 1%, 5% and 10%, respectively.

4.2. Milk Market chain actors and their roles

4.2.1. Value chain map

The milk and milk products pass through different marketing agents before reaching the end users. To tackle constraints and access available opportunities by value chain actors, it is necessary to identify the main value chain actors and functions involved in the entire value chain. The main functions in milk value chain are input supply, production, collection, wholesaling, processing, retailing and consumption whereas the major actors in milk value chain are input suppliers, producers, processors, traders (collectors, wholesalers , retailers and Cafe/Hotel owners), and consumers. Based on the roles and functions, the major milk value chain actors and their relationship in Girar Jarso District is shown below using value chain mapping (Figure 2). Value chain mapping is important to easily understand the movement of the product from beginning to end consumer via various actors (Tegegne 2017).

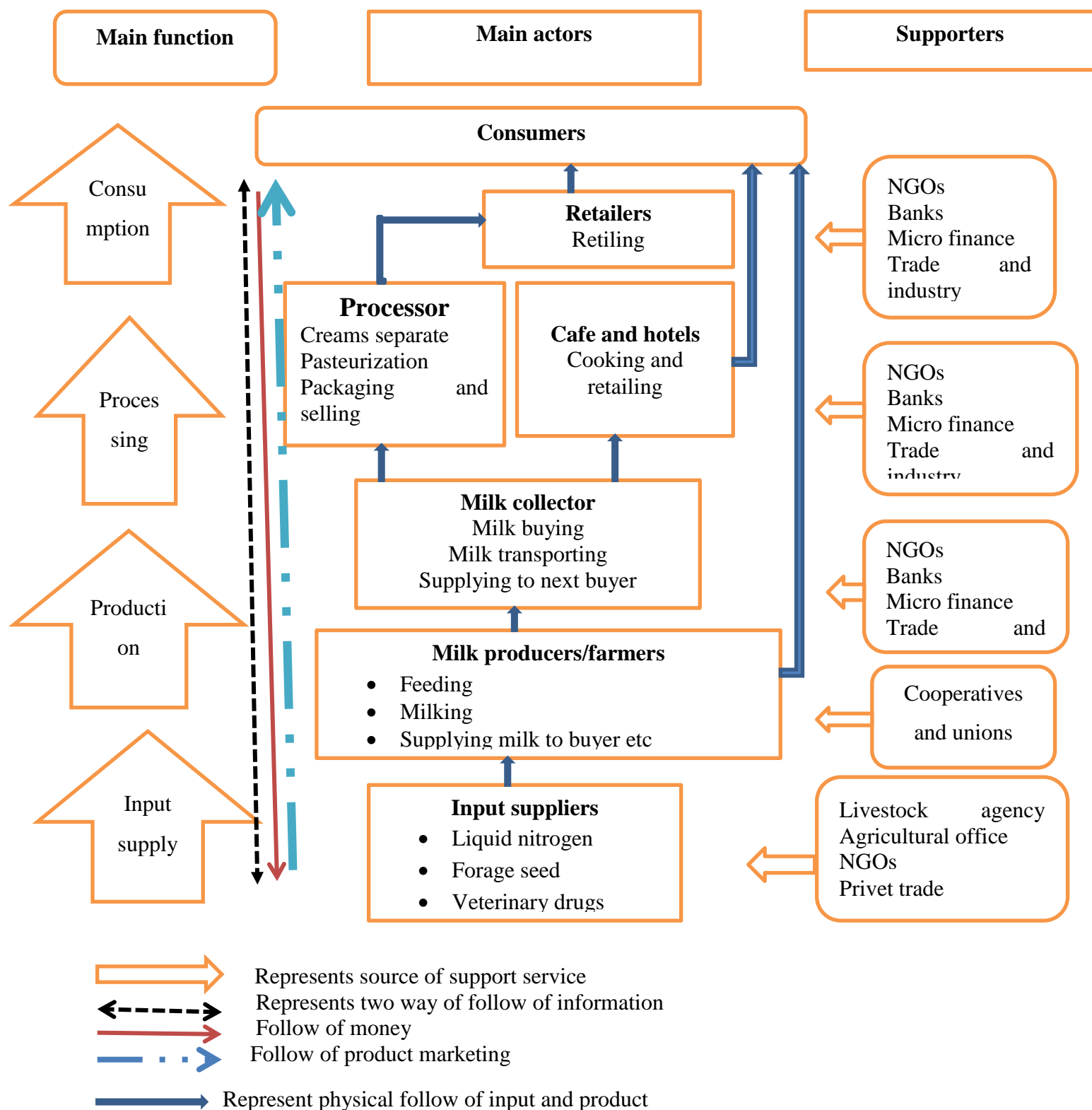


Figure 5: map of milk value chain

Source: our map for survey data (2022)

4.2.2. Milk Market chain actors' role

In this study, different milk marketing actors were identified. Milk marketing actors in the study area includes milk producers, collectors, retailers, farmers' cooperative, processors and final consumers of the product.

Producer: Majority of the milk producers in the study area were traditional smallholders. Their key functions were to produce (harvest), transport and sale milk. The majority of producer's sale fresh milk and, some producer undertake a little form of intermediate level of processing which is no more than separation of butter from other product of milk. Producers sell their milk to different buyers involved in the market at near village or district market/collection center levels.

Collectors: these are traders in assembly markets who collect milk from producers in village markets and from farms for the purpose of reselling it to wholesalers. They use their financial resources and their local knowledge to collect milk from the surrounding area. They play important role and they do know areas of surplus well. Collectors are the key actors in the milk market chain, responsible for the trading of milk from production areas to wholesalers who transport milk to Sululta and Addis Ababa markets in the study area.

Retailers: They mostly buy from processors and sell to urban consumers. Consumers usually buy the product from retailers as they offer according to requirement and purchasing power of the buyers. Retailers at G/Jarso districts who bought milk from smallholder producers and sell it to local consumers in restaurants and or at their own small shops in urban centers and retails partially processed milk products(ergo) to satisfy local demands especially in Fiche town.,

Processors: Processors were one of the value additions on milk products that are prepared at household level for consumption or at local commercial level. One of the households value added product is butter which may consumed at household level or sold to the better market in the districts. In the study area there was a shortage of processing technology that hinders smallholders to participate on the value addition activities. As a result of this smallholders were forced to sale row milk to Addis Ababa and Sululta through collectors.

Consumers: Consumers are those purchasing the products for consumption. It is the shorter the marketing channel, the more likely is the retail price going to be affordable. The private consumers are employees, urban and rural dwellers that purchase and consume milk with an average income of producer or retailers directly when, they needed. These are individual actors who buy milk for their own consumption directly from producers.

4.3. Milk Marketing Chain

A marketing chain may link both formal and informal market agents. The survey results depicts that milk in the study area was found to be marketed through both formal and informal marketing channels. Further, the survey result revealed that milk marketing chains prevailing in the milk center was found to be comprised of various milk marketing channels and a number of the respective market player.

4.3.1. Milk marketing channels

The number of intermediaries in a given marketing channel will have a bearing effect on both producer and consumer milk prices. The shorter the channel the more likely that the consumer prices will be low and the producer will get a higher return. The survey result identified that there were different types of milk marketing channels in the study area during the survey period. Milk was found to be supplied to Sebata and Addis Ababa from North shoa as in the area there was no milk processing firms and deficit of milk supply at Sebata and Addis Ababa where there was a milk processing firms.

The major milk marketing channels of the study area:

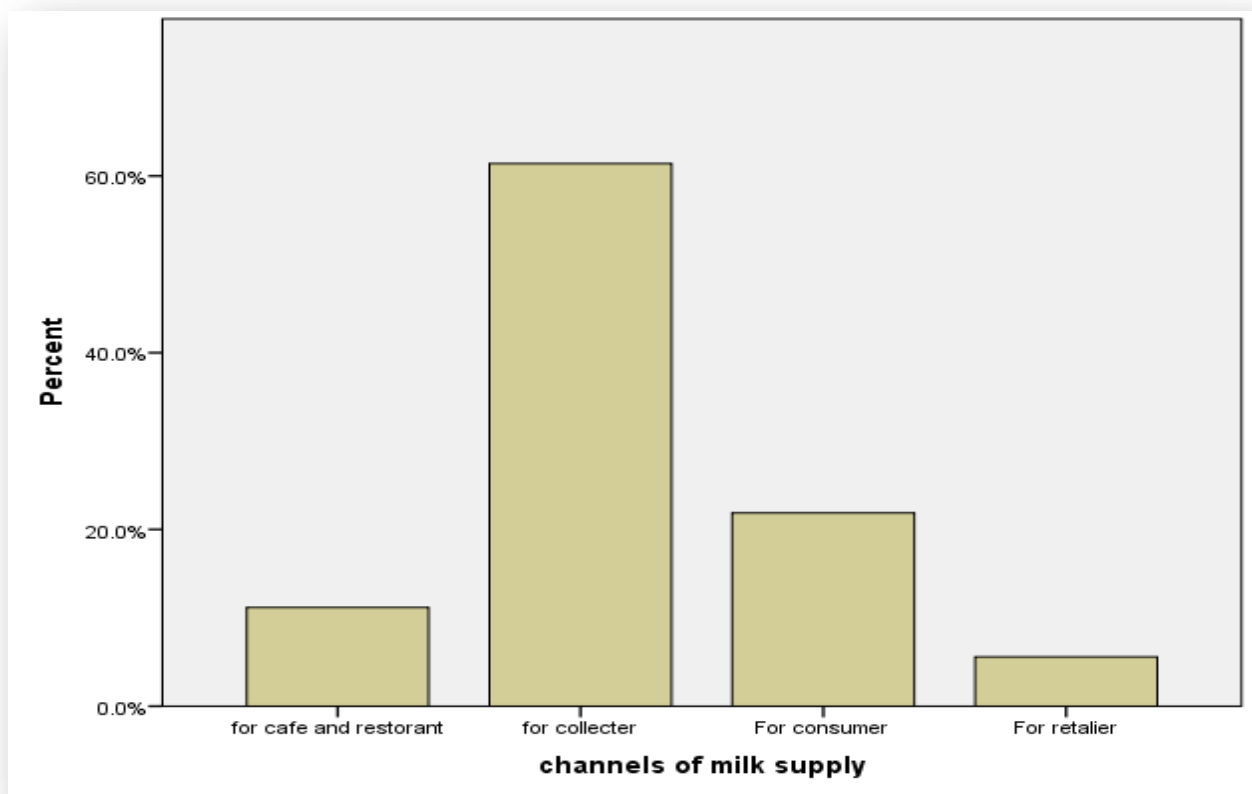
Producer → Consumer: on this channel 21.9% of households who participate on the milk marketing (Table 7). The channel selected by milk producers because of the price of milk becomes increase as comperes to other channels. But there is no large number of producers participated on this milk marketing channels do to the milk purchase power of consumers are lower.

Producer → collector: This channel represents 61.4% of house hold supply their milk to collectors. In terms of volume of milk marketed supply this channel was the highest volume of

milk to be sold. This was the case because this channel was the most reliable and best alternative source of milk supply for wholesalers milk supply to who supply to processors and in Sebeta and Addis Ababa where demand for milk exceeds supply of milk.

Producer → Retailer: The channel counts from 5.6% of total milk supplier households. This channel was act as source of milk supply for cafes and restaurants in the study area. This seems to be less important as compared to other marketing channels. This seems the case because of limited and no well-established and reliable retailers in the study area which result to less volume of milk sold through retailers.

Producer → café and restaurant: on this channel 11.9% of households participated on milk marketing. in terms of volume of milk market supply is low. This is because of retailers were a source of milk supply for café and restaurants.



Source: own survey result (2022)

Figure 6: channels of milk market supply

4.4. Econometric Result and Discussion Factor Affecting Volume of Milk Market

The main objective of this study was to examine the factors affecting the volume of milk supply in GirarJarso district. In order to identify variables influencing the milk production, the Ordinary least square model (linear regression) was used. The multiples linear regression requires the dependent variable to be continuous.

Before computing the multiple linear regression models, the presence of multicollinearity problem among the independent variables was tested. To test multicollinearity among independent variables, variance inflation factor (VIF) and contingency coefficient (CC)) were used. The variance inflator factor (VIF) and coefficient of contingency (CC) (Gujarati, 2004) were used to check the existence of multicollinearity for continuous and discrete explanatory variables, respectively.

Contingency coefficient ranges from 0 to 1. zero implies no association between the explanatory variables whereas values close to 1 indicates high degree of association between the independent variables. If a value of CC becomes greater than 0.75, it displays there is multicollinearity problem. As indicated in Appendix I, there is no multicollinearity problem between each independent variable.

Similarly, Variance inflation factor (VIF) was used to test multicollinearity problem among continues variables. VIF value greater than 10 implies that there is multicollinearity problem among explanatory variables (Gujarati, 2004). The VIF value displays that there is no sever multicollinearity problem among variables (Appendix I).

The hetroscdasiticity problem was minimized by applying robust standard at the time of linear regression as well as the omitted variable test also employed by using link test command in STATA (appendix I). R^2 shows the fitness of the model for the dependent variable which is express by the independent variables at 79.5% which is good.

And the model goodness of fit also indicated there. The adjusted R^2 shows that, about 77.8% of the variation affects volume of milk market supply were attributed to having better education level, access to credit, access to dairy extension service, experience of dairy production, number

of cross breed cows and number of local breed cows. The remaining 33% implies that there are other factors that affect milk market supply in the study area.

4.4.1. Factors Affecting Milk Market supply (Volume of Sales)

In the model, 7 potential continuous and 4 discrete variables were entered. Out of the total of eleven explanatory (predictors) variables only 6 variables of which 4 were continuous and 2 were dummies found to be significantly influencing the volume of milk supply. Variables found to be significant included; educational level of the household head (EDL), access for credit (ACCR), access to dairy production extension service (ACDEP), Number of cross breed milking cows (NCBD), experience in milk production (ExMP) and Number of Local breed milking cow (NLBD) were found to be statistically significant. The sig value of other 5 explanatory variables was not statistically significant that relatively they were less important in affecting the volume of milk supply in marketing center. With the above brief background, the effect of the significant explanatory variables on the volume of milk marketing was discussed below.

Household heads educational level: Education level of household's positively significant affects volume of milk market supply at less than 1% probability level. This due to education enhances managerial fitness in production, processing, marketing and enables to understand and interpret information. The coefficient of this variable showed that a unit increase in formal school year would increase household milk supply by 0.912liters. This result is consistent to Kebede et al. (2015) and Gemechuet *al.* (2021).

Access to credit service: Access to credit had a positive effect on milk supply to market statically significant less than 1% significant level. This probably due to farmers who received credit purchase more number of improved breed dairy cows, feed and other inputs that enables farmer to produce more volume of milk. The result of coefficient shows that farmer access to credit services will increase milk supplied to the market by 3.66 liters. This result is confirmed to Haregeweyn (2015) and Nardos (2010).

Household heads experience in milk production: experience of milk production is very important in milk market supply. As the result of the survey indicated, experience of household head affected milk market supply positively and significantly at less than 1% significance level.

An increase of production experience by one year increases the volume of milk market supply by 0.621 liters. This might be due to well experienced household head produce more volume of milk and then supply more to the market. But this study contradicts the result of Woldemichael (2008). The author elaborated the issue of negative relationship between experience and milk market participation that local breed dairy cow owners had larger experience in dairy production because they had been integrating livestock with crop for long period rather than specializing in dairy production.

Access to extension services:- Access extension service positively affects milk market supply statistically significant at less than 1% significant level. This was because of receiving enough access to extension service from the development agent increase farmer's knowledge in dairy production and marketing. The marginal effect shows that when the farmers have enough access to extension contact would increase the volume milk market by 6.27%. This finding is similar to Gemechu et al. (2021) and Meryem (2013)

The policy implications are that access to adequate and appropriate extension should be one of the priority policy interventions if government is to increase milk sales volume from the smallholder dairy producers. This would increase milk production and hence milk sales volume to the milk collection centers.

Total number of cross breed cows:- As it was expected, this variable has positive relationship with household milk production and was statistically significant at 1% significant level. The positive and significant relation between the variables indicates that as the number of cross breed milking cow increases, milk production per dairy household also increases which in turn increases percentage share of sale volume of milk per day per household. The marginal effect of the variable also confirms that a unit increase in cross breed dairy milking cow leads the probability of dairy household milk production to rise by 4.09 liter. Moreover, the result designate that increasing number of quality cross breeds dairy cows is an important variable in stimulating the smallholder to produce more milk and benefit from economic transaction. This result line with Gemechu *et al.* (2021), Ali (2017) and Woldemicha *et al* (2008).

Number of total local breed milking cows: As it was expected, this variable has positive relationship with milk market supply and was statistically significant at 1% significant level. The positive and significant relation between the variables indicates that as the number of local breed

milking cow increases, milk production per dairy household also increases which in turn increases percentage share of sale volume of milk per household. The marginal effect of the variable also confirms that a unit increase in local breed dairy milking cow leads the probability of dairy household milk production to rise by 4.73 liter. The result supported by Gizachew *et al.* (2005), Ali (2017) and Gemechu *et al.* (2021).

Table 7: Factors affecting volume of milk Sales estimation result

Variables	Estimation technique Coefficient	result of OLS Standard Error	T	P> t
VMS				
SEX	.0772217	1.332962	0.06	0.954
AGE	.0077536	.0714855	0.11	0.914
EDL	.9121069	.240091	3.8	0.000***
FSH	-.0817044	.4802163	-0.17	0.865
ExMP	.6219357	.1699156	3.66	0.000***
ACCR	3.665282	1.273851	2.88	0.005***
ACDPE	6.270893	1.391311	4.51	0.000***
AMI	-.2821745	1.078939	-0.26	0.794
NCBMC	4.091385	.6236659	6.56	0.000***
NLBMC	2.739255	1.165861	2.35	0.020**
-cons	9.232626	2.959105	3.12	0.002

** =significant at 5% ***=significant at 1% F (10, 121) = 35.77 R-squared =0.7950

Adj R-Square= 0.7781

Source: own survey result, 2022

4.5. Milk Marketing Constraints

There are a number of highlighted constraints that hamper further development of milk production and marketing in the study area. Given the current production level, there appears that the producers have wide range of market problems. However, high price of dairy cow, and low price of milk and milk product might have contributed to problems currently prevailing in the milk marketing.

Table 8: summarizes marketing issue that has impact on milk marketing potential of the areas. The result depicts that from the total respondents of milk producing household 27%, 15.2%, 9.9%, 27.4% and 20.5%, reported that high price of dairy cow, lack of credit, occurrence of animal diseases, low price of milk and milk product and shortage of cow feed the main constraints of milk producers in supplying milk to the market respectively.

In addition to this from the key informant interview made with milk producers and collectors, they reported that seasonality of demand for and supply of milk was one of their vital problems in dairy production and marketing. Animal health services was limited by few government veterinary services, lack of skills in different aspects of dairy activities were among the other problems encountered in the studied areas. Poor milk cattle management system had negative impact on milk production system of the area. Even though there is an access for extension service, particularly to urban dairy producers, there is an application problem among the producers this might be the way of giving training and it needs further training should be given for more clarification of like dairy farm management, milk handling and hygiene, marketing, feed preparation entrepreneurial skills development, sound market opportunity and linkage. The findings supported by Nardos (2010).

Table 8: constraints of milk market supply

Variables	Response	Percent %
high price of dairy cow	128	27
lack of credit	72	15.2
occurrence of animal diseases	47	9.9
low price of milk and milk product	130	27.4
Shortage of cow feed	97	20.5
Total	474	100

Source: own survey result (2022)

In the discussion part, it was indicated that only 36.36% of the sampled dairy producers were accessed to various credit sources. This highlights that shortage of finance was found to be one of the critical problems in dairy production for sampled dairy producers. Moreover, the credit

system was not well developed in the study areas. Private Banks was not interested to finance agriculture in general and dairy production in particular due to the risks associated with dairy production and marketing activities. Micro credit is typically short-term loan that can help in financing working capital, but not investment capital required to improve market participation. Informal credit from conventional lenders was often quick and less difficult to obtain, but because of the risk involved, it was very limited in amount, and involve restrictive conditions in terms of repayment and interest. These findings supported by Getachew et al. (2016) that low access to credit are the most dominant constraints in central zone of Tigray.

The other major constraints of the study area were the price of fluid milk is very low but the price of cost of feeds and price of milking cows relatively high. These realize that milk producers not motivated to supply large volume of fluid milks in the market.

4.6. Opportunities for milk production and marketing

Milk production provides the opportunity for small holder farmers to use land, labor, and feed resources and generate regular income. In this respect, support services in terms of accessing adequate land, organizing input supplies (improved genetic material, feeds, AI, drugs), provision of credit, extension and training services, production and entrepreneurial skills development, sound market opportunity and linkage are the key elements of success for the milk industry (Sintyehu *et al.*, 2008).

Although many problems and constraints that may hinder the development of the dairy sector were identified in the area, the majority of dairy producers (93.5%) in the study area were willing to continue, expand and/or involve in dairy farm in the future. The rest 7.5% of the producers were not willing to expand dairy farm in the future for various reasons.

The result depicts that from the total respondents of milk producing household 45.3%, 38.5%, and 16.2% reported that better market access for milk and milk product, availability of livestock professional extension service and availability of veterinary service are the main opportunities of milk producers in supplying milk to the market respectively (table 9).

Dairying provides the opportunity for smallholder farmers to use land, labor and feed resources and generate regular income. Although it might be enough for sustainable dairy development, there is also an opportunity for smallholder dairy producers and other individuals and investors

regarding to support services in terms of accessing adequate land for dairy cooperatives, organizing input supplies (improved genetic material, feeds, AI, drugs), provision of credit, extension and training services. This study supported by Getachew *et al.*(2016).

Table 9: opportunities of milk marketing and production

Variables	Responses	Percent (%)
Better market access for milk and milk products	106	45.3
Availability of extension service	90	38.5
Availability of veterinary service	38	16.2
Total	234	100

Source: own survey data 2022

In the study area, there are huge opportunities for improving the productivity dairy cow and marketing of fluid milk at the time of key informant interviews. The existing opportunities for developing the milk market supply area are: Availability of suitable agro-ecology for dairy cow production. This realized the potentiality of the area for milk production. The Availability dairy farm cooperatives for fluid milk are other opportunity. There are availability of large number of collectors in the districts and GirarJarso nearest to Addis Abeba and Sebeta milk processors and wholesalers. The town also endowed with market opportunity including university and college staff and students, restaurants and hotels in fitche.

CHAPTER FIVE

5. SUMMERY, CONCLUSION AND RECOMMENDATION

5.1. Summery and Conclusion

The primary objectives of this study was to investigate smallholder farmers of milk producer supply milk in the market in the GirarJarso district North Shewa zone Oromia National Regional State, Ethiopia. Milk was the most important dairy products marketed in the areas. The primary information gathered from 132 smallholder dairy farm cooperatives through three stage sampling procedure and interview using structured questionnaire.

The result of the survey findings indicated that about 69.7% and 30.3% of sample households were male and female headed respondents found to be milk market supply respectively. The mean age, milk production experience, family size and educational level of the total sample household heads were 39.07 years, 7.5 years 3.5, and 3.08 years of formal schooling, respectively. According to respondents, about 36.6%, 41.67% and 41.67% sample households were access to credit service, access to extension service and market information respectively. The mean total milking cow holdings per sample household was 1.78 cows whereas average The average daily milk allocation for market supply per sample households in the study area were 29.74 liters.

Mapping of milk value chain showed the main milk value chain actors, their functions and support services. The main milk value chain actors identified in the study area were input supplier, milk producers, milk processors, collectors, wholesalers, Cafes/Hotels, retailers and consumers. Four milk market channels were identified of which producer to consumer, collector retailer and café and restaurants. Collectors carried the highest volume of milk buyers than other actors were the leading benefit of these market actors were producers are members of this dairy milk cooperatives. Large number of producers' supply there milk to collectors.

To analyze factors affecting milk market supply, multiple liner regression models were used. Thus, the result of multiple liner regression model revealed that educational level of the household, Household access for credit, experience in milk production, number of cross breed milking cow owned and number of local breed cow owned were found to exert positively and significantly impact on the households milk marketing supply. The selection equation result

depicts that about 79.5% of the variation in volume of milk market supply is explained by the independent variables used in the analyses.

The positive effect of education level of households on milk market supply might be due to the reason that education enhances managerial fitness in production, processing, marketing and enables to understand and interpret information. Having higher number of either local or cross breed milking cows per household increases the smallholder milk producer households' volume of milk market supply from the fact that increased number of local or cross breed milking cows would result in increased volume of milk production and thereby triggers producers to participate in milk market supply. The positive and significant effect of access to credit service and dairy production extension service on smallholder milk producer households' in milk market supply implies that as the milk producer households provided with access to credit service and access to extension service in milk market supply also increase. This stands from the reality that access to credit service producers purchase more number of improved breed dairy cows, feed and other inputs that enables farmer to increase their production whereas extension service builds the households knowledge and skill thereby supplying to market of their produce.

From the study it was noted that existing in milk marketing are faced by many constraints. The major constraints for milk marketing in the area includes low price of milk and milk products, high price of dairy cows, shortage of feed, lack of credit, seasonality of milk demand and occurrence of disease were the main constraints of milk producer in supplying milk to market. In addition to this from the key informant interview made with milk producers, they reported that seasonality of demand for supply of milk was one of their vital problems in dairy production and marketing. Where as in the study area, there were huge opportunities for improving the productivity dairy cow and marketing of fluid milk. These are availability of suitable agro-ecology for dairy cow, dairy farm cooperatives, large number of collectors in the districts and availability of milk marketing center.

5.2. Recommendation

On the basis of the results of this study, the following policy implications are recommended so as to be considered in the future intervention strategies which are aimed at the promotion of dairy production and marketing in the study area.

- The multiple liner regression model analysis result has shown that milk market supply was positively and significantly affected by formal education level of the dairy household head. This result confirms that education improves the readiness of the dairy household to accept new idea and innovations, and get updated demand and supply price information which in turn enhances their willingness to produce more. Thus, government and other dairy sector development partners should emphasis on capacity building of the dairy smallholders through short and intermediate practical based training.
- Government and other development bodies should give attention in supporting producers through providing training on the how to enhance milk production and providing update information on milk marketing system.
- Agricultural staffs of extension workers should promote the provision of extension service for milk producers with regard to milk market supply to boost efficiency and confidence of milk producers in milk marketing supply and further enhancement of consistently involvement in milk business rather than going forth and back.
- Government sectors (more appropriately agricultural sector) should give technical support on specialization approach of dairy sector for those milk producer farmers having hope to fully engaged in milk production via specialization.
- The positive correlation of number of either local or cross breed milking cows owned with the probability and intensity of milk producers' participation in milk market supply demands agricultural sector to give emphasis on timely provision of inputs/heifers (preferably cross breed) and technical support service to increase production of milk per cow and promote producers participation in milk market supply.
- Awareness creation should be given by agricultural extension workers for milk producers to promote their business oriented skill among family members.

6. REFERENCE

- AGP (Agricultural Growth Program), 2013. Livestock Market Development Project.
- AGP-LMD (Agricultural Growth Project Livestock Market Development) (2013), “Livestock Market Development End Market Analysis for Meat/Live Animals, Leather and Leather Products dairy Products Value Chains,” USAID Project No. AID-663-C-12-00009.
- Asfaw Negassa, 2009. Improving smallholder farmers’ marketed supply and market access for dairy products in Arsi Zone, Ethiopia. Research Report 21.ILRI (International Livestock Research Institute), Nairobi, Kenya. 107 pp.
- Bedilu Demissie, Hussien H. Komicha and Adem Kedir, 2014. Factors affecting camel and cow milk marketed surplus: the case of eastern Ethiopia. African Journal of Agricultural Science and Technology (AJAST) Vol. 2, Issue 2, pp. 54-58.
- Berhanu Kuma, 2012. Market Access and Value Chain Analysis of Dairy Industry in Ethiopia: The Case of Wolaita Zone: A Dissertation Submitted to the School of Agricultural Economics and Agribusiness, School of Graduate Studies, Haramaya University.
- Berhanu Kuma, Derek Baker, Kindie Getnet and Belay Kassa, 2014. Factors affecting milk market participation and volume of supply in Ethiopia. Asian Journal of Rural Development, 4(1):1-15, 2014
- Bultossa Terefe Willy, 2016. Key Factors Affecting Market Participation of Small Dairy Farmers: the Case of Bako Tibe District, West Showa Zone, Oromia, Ethiopia Paper for presentation at the 14th International Conference on the Ethiopian Economy. Ethiopian Economic Association (EEA) Conference Centre, Addis Ababa, Ethiopia, July 21-23, 2016
- CIA (Central Intelligence Agency) (2017), “World Fact Book on Overview of the Ethiopian Economy,” available at: <https://www.cia.gov/the-world-factbook/countries/ethiopia/#economy>.
- Creswell. (2002). Planning, Conducting, and Evaluating Quantitative Research. University of Nebraska–Lincoln.

- CSA (Central Statistical Agency of Ethiopia), 2015. Agricultural Sample Survey 2014/15 Volume II Report On Livestock And Livestock Characteristics (Private Peasant Holdings). Addis Ababa, March 2015
- CSA (Central Statistical Agency) (2018), “Agricultural Sample Survey, Federal Democratic Republic of Ethiopia Statistical Report on Livestock and Livestock Characteristics,” Volume II.
- CSA. (2012). Agricultural Sample Survey. Livestock, Poultry and Beehives population (private peasant holdings). Federal Democratic Republic of Ethiopia Central Statistical Authority (CSA), Addis Ababa, Ethiopia.
- FAO (Food and Agriculture Organization of the United Nations), 2011. Livestock Assets, Livestock Income and Rural Households Cross-Country Evidence from Household Surveys FAOSTAT <http://www.fao.org/corp/statistics/>
- FAO. 2020. FAOstat: <http://www.fao.org/faostat/en/#data/QL>. [Accessed on 20 September 2020].
- Gates R. 2006. A Mata Geweke-Hajivassiliou–Keane multivariate normal simulator. *Stata J.* 6:190-213.
- Felleke, G. & Geda, G. 2001. The Ethiopian dairy development policy: a draft policy document. Ministry of agriculture (MoA), Addis Ababa, Ethiopia.
- Gebremedhin, B., Hoekstra, D. and Jemaneh, S., 2007. Heading towards commercialization? The case of live animal marketing in Ethiopia. *IPMS Working Paper*.
- Getachew M. Yassin I. Berhanu G. 2016. Opportunities and Constraints of Cow Milk Value Chain: The Case of Laelay Maichew District, Central Zone of Tigray, Ethiopia. ISSN 2224-6096 (Paper) ISSN 2225-0581 (online) Vol.6, No.8, 2016.
- Holloway, G., and S. Ehui, 2002. Expanding market participation among smallholder livestock producers: A collection of studies employing Gibbs sampling and data from the Ethiopian 124 highlands. Socio-economic and Policy Research Working Paper 48. ILRI, Nairobi, Kenya. 85p.

- Holloway, G., C. Nicholson, C. Delgado, S. Staal and S. Ehui, 2000. How to make a milk market: a case study from the Ethiopian highlands. Socio-economic and Policy Research Working Paper 28. ILRI. Nairobi, Kenya. 85p.
- Islam, M., H. Miah, and M. Haque, 2001. Marketing system of marine fish in Bangladesh. *Bangladesh Journal of Agricultural Economics*. 24(2): 127-142.
- Kuma, B., 2012. *Market access and value chain analysis of dairy industry in Ethiopia: The case of Wolaita Zone* (Doctoral dissertation, Haramaya University).
- Kumar A., 2010. Milk Marketing Chains in Bihar: Implications for Dairy Farmers and Traders. National Centre for Agricultural Economics and Policy Research, New Delhi – 110 012. *Agric. Econ. Res. Rev.* 23: 469-477.
- Land O'Lakes, 2010. The Next Stage In Dairy Development for Ethiopia: Dairy Value Chains, End Markets and Food Security Cooperative Agreement 663-A-00-05-00431-00. Addis Ababa, Ethiopia
- Matawork Milkias Gobena, 2016. Household Dairy Production System, Marketing and Constraints in Ethiopia Jimma University College of Agriculture and Veterinary Medicine Department of Animal Production *Journal of Marketing and Consumer Research* .
- Mendoza, G., 1995. A primer on marketing channel and margins. Lyme Rimer Publishers Inc., USA.
- Meryem Kuru, 2013. Analysis of Cow Milk Market Chain: The Case of Sululta District, Oromia Special Zone Surrounding Finfinne, Ethiopia. An MSc Thesis presented to the School of Graduate Studies of Alemaya University.
- Minten, B., Y. Habte, S. Tamru, and A. Tesfaye (2018), "Transforming Agri-Food Systems in Ethiopia: Evidence from the Dairy Sector," International Food Policy Research Institute (IFPRI), No.129.

- Mohamed AM. Ahmed, Simeon E, Yemesrach A. 2004. Dairy development in Ethiopia. EPTD discussion paper No. 123. International Food Policy Research Institute. Washington DC, U.S.A.
- Muhammed, U. (2011), “Market Chain Analysis of Teff and Bread Wheat Production in Halaba Special Woreda, Southern Ethiopia,” Master Thesis presented to Haramaya University, Ethiopia.
- Mulugeta Tesfaye, Assefa Beze, and Kitaw Degefa. 2019. Dairy plant processing capacity and challenges in milk processing industry of Ethiopia. *Eur. J. Bio. Sci.* 11(3):106-113.
- Muricho, G., M. Kassie and G. Obare (2015), “Determinants of Market Participation Regimes among Smallholder Maize Producers in Kenya,” Adoption Pathways Project Discussion Paper.
- Muriuki, HG & Thorpe, W. 2001. Regional synthesis: Smallholder Dairy Production and Marketing in East and South Africa. In: Proceeding of the SouthSouth Workshop on Smallholder Dairy Production and Marketing – Constraints and Opportunities. March 12th-16th, 2001, Anand, India. NDDDB (National Dairy Development Board) and ILRI (International Livestock Research Institute).
- Nardos, eshetu., 2010. Determinants, challenges and prospects of dairy production and marketing in mekelle city. Master Thesis presented to Mekele University, Ethiopia.
- OECD (Organisation for Economic Cooperation and Development) (2016), “Agricultural Outlook 2016-2025 in Agriculture in Sub-Saharan Africa: Prospects and Challenges for the Next Decade,” Paris: OECD Publishing.
- Otekunrin, O. A., S. Momoh and I. A. Ayinde (2019), “Smallholder Farmers’ Market Participation: Concepts and Methodological Approach from Sub-Saharan Africa,” *Current Agriculture Research Journal*, 7(2), 139-157.
- Redda, T. 2001. Small-scale Milk Marketing and Processing in Ethiopia. In: Proceedings of the South – South Workshop on Smallholder Dairy Production and Marketing – Constraints and Opportunities. March 12th –16th 2001, Anand, India

- Reddy, G.P., P.G. Chengappa and L. Achotch, 19 95. Marketed surplus response of millets: some policy implications. *Indian J. Agric. Economics* . L(4) 668-674
- Shapiro, B., G. Gebru, S. Desta, A. Negassa, K. Nigussie, A. Gezahegn and M. Henok (2017), “Ethiopia Livestock Sector Analysis,” A 15-year Livestock Sector Strategy.
- SNV (Netherlands Development Organization), 2008. Dairy investment opportunities in Ethiopia. A case study report. Addis Ababa, Ethiopia: SNV-Netherlands Development Organization. Available at:<http://www.snvworld.org/en/Documents/Dairy%20Investment%20Opportunities%20in%20Ethiopia.pdf>
- Solomon Tilahun, 2004. Performance of Cattle Marketing System in Southern Ethiopia: With Special Emphasis on Borena Zone. M.Sc. Thesis Presented to the School of Graduate Studies of Alemaya University, Ethiopia. 114p.
- Staat, S.J. 1995. Peri-urban dairying and public policies in Ethiopia and Kenya: A comparative economic and institutional analysis. Dept of Food and Resources Economics, Univ. of Florida, Gainesville, Florida, USA. (PhD dissertation)
- Tadele Mamo, Tewodros Tefera and Noreen Byre, 2014. Factors influencing urban and periurban dairy producers’ participation in milk value addition and volume of milk value added in Welmera Woreda, West Shewa Zone of Oromia Regional State, Ethiopia. *International journal of livestock production*.
- Tadesse Kenea Amentae, Girma Gebresenbet , David Ljungberg, 2015. Characterizing Milk Supply and Marketing Chains and Losses in Wolmera and Ejere Districts of Ethiopia. *Journal of Service Science and Management*, 201 5, 8, 823 -843
- Tadesse. Guadu, and Mengistie. Abebaw, 2013. Challenges, Opportunities and Prospects of Dairy Farming in Ethiopia: A Review, Department of Veterinary Epidemiology and Public Health, Faculty of Veterinary Medicine, University of Gondar, Po.Box 196, Gondar, Ethiopia *World Journal of Dairy & Food Sciences* 11 (1): 01-09,
- Tegegn, A., Gebremedhin, B., Hoekstra, D., Belay, B. and Mekasha, Y, 2013. Smallholder dairy production and marketing systems in Ethiopia: IPMS experiences and opportunities for

- market-oriented development. IPMS Working Paper 31. Nairobi, Kenya: ILRI (International Livestock Research Institute).
- Thakur, D.S., D.R. Harbans Lal, K.D.Sharma and A.S.Saini, 1997. Market supply responses and marketing problems of farmers in the Hills. *Indian J. Agric. Economics*. 52(1): 139-150.
- Tschirley D, Hagglblade S, and Reardon T. 2014. Africa's Emerging Food System Transformation: Eastern and Southern Africa. Available at: <https://gcfsi.isp.msu.edu/files/7214/6229/3434/w1.pdf> [Accessed May 16, 2021].
- Woldemichael Somano, 2008. Dairy marketing chains analysis: the case of shashemane, Hawassa and dale districts' milk shed, southern Ethiopia: A thesis submitted to the department of agricultural economics, School of graduate studies. Haramaya University.
- Yilma, Z., G.B., Emannuelle and S., Ameha. 2011. A Review of the Ethiopian Dairy Sector. Ed. Rudolf Fombad, Food and Agriculture Organization of the United Nations, Sub Regional Office for Eastern Africa (FAO/SFE), Addis Ababa, Ethiopia, pp 81.
- Zelalem Yilma, Yonas Hailu, Takele Wolkaro, and Mitiku Eshetu. 2017. The Ethiopian dairy value chain with a particular focus on cattle and camel milk: Current scenarios and investment opportunities. *East Afr. J. Sci*. 11(2):81-92

7. APPENDIX

Salale University

A Survey Questionnaire for Smallholder Milk Producers' Households (analysis of milk market chain)

NOTE: This questionnaire has been prepared for academic research purpose. The information you are going to provide will not be passed over to any other third party. Therefore, you are kindly requested to give genuine responses as the success of this research depends on how genuine responses are.

Thank you very much.

Questionnaire serial No _____

Part I: General Background of the household

1. Sex of the household head : 1= male 2 = female;
2. Age of the household head (years) _____
3. Educational level of the house hold head in year _____
1. Not educated 2 =1-8 2 = 9-12 4 collage and above
4. Household size _____ (Male) _____ Female _____

Household size	Male	Female
1		
2		
3		
4		
5		
6		
7		

5. Total no of cow _____ Local Cow _____ Cross Breed cow _____
6. Experience in milk production (years) _____

Part II Livelihoods or Income sources

8. What is your cow average number of months per lactation?

(1) Local cow _____ (2) cross breed _____

9. How many litters of milk your cow produces daily? _____

1) Local cow (liter) _____ (2) cross breed (litters) _____

10. To whom do you supply milk? (Mark the “X” at chooses, multiple choice is possible).

Sell to whom?	Possible fluid milk marketing outlet choice						
	1 for retailer	2 for collector	3 for wholesaler	4 for processor	5 for consumer	6 for café or restaurant	
Milk price/liter							

11. What is your reason for the choice of the channel you are using to sell fluid milk?

1. Fair price 2. Member to the cooperative 3. Well access of transportation
4. Proximity to market center 5. Presence of market information

12. How do you get paid?

- 1= Immediate cash payment 2= future payment 3= Immediate in-kind payment

13. Who determine the price?

- 1= myself; 2= Retailers; 3= collectors; 4= wholesalers; 5 = Brokers;

14. Do you have access of milk market information where and to whom to sell?

- 1=Yes; 0= No

15. How to get you milk market information?

- 1= via radio/TV, 2= from brokers 4= retailers; 5= Cafes/Hotels; 6= processors; 7= from friends

16. To which cooperative organization is a member? (encircle the best match)

- 1= Member of milk producer cooperative 2= member of milk processors cooperative

17. Reason for membership in the organization?

- 1= bargaining power; 2= better profitability, 3=able to process into different milk products

Part III support services

18. What supportive service do you have available in your area and do you get such service?

Possible to answer two supportive services.

1. Credit service 2. Extension service

19. What are the major challenges you face milk marketing practices?
1=no constraints; 2=high price of dairy cow; 3=lack of credit to buy cow and other inputs; 4=disease occurrence; 5=low price of milk and milk products; 6= shortage of feed
7=Absence of milk producers cooperative and milk processing center
20. What are the major opportunities to enter milk production and marketing activities do you have?
(1) Better market access for milk and milk products;
(2) Availability of livestock professionals for extension support service;
(3) Availability of veterinary service;
(4) All

Check list for interview

1. What are the major challenges for milk production and marketing?
2. What kind of services do you get and what type you could not get?
3. What are the opportunities to continue in dairy production in the future?
4. How do you see the benefit of getting dairying training for your production?
5. What are the advantages to work dairying in cooperative?
6. What do you recommend in order to provide a solution for current challenges?

Appendix II: Diagnosis test results for independent variables.

I. Multicollinearity test for discrete variable

cor SEX ACCR ACDPE AMI

(obs=132)

	SEX	ACCR	ACDPE	AMI
SEX	1.0000			
ACCR	0.3271	1.0000		
ACDPE	0.4793	0.4153	1.0000	
AMI	0.2229	0.1597	0.0909	1.0000

II. Multicollinearity test for continuous variable

VIF

Variable	VIF	1/VIF
EDL	2.15	0.465782
ExMP	1.75	0.572297
CBD	1.53	0.655359
AGE	1.44	0.695759
LBD	1.05	0.951113
FSH	1.01	0.988852
Mean VIF	1.49	

III. Test of omitted variable

linktest

VMS	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
_hat	1.817164	.2266368	8.02	0.000	1.368757	2.26557
_hatsq	-.0125916	.0034301	-3.67	0.000	-.0193782	-.0058049
_cons	-11.62282	3.440629	-3.38	0.001	-18.43019	-4.815455

IV. Model goodness of fit

```
reg VMS SEX AGE EDL FSH ExMP ACCR ACDPE AMI NCBD NLBD
```

```

Source |      SS      df    MS      Number of obs =    132
-----+-----
Model | 16114.7323     10 1611.47323  Prob > F      =    0.0000
Residual | 4154.9268     121  34.338238  R-squared     =    0.7950
-----+-----
Total | 20269.6591     131 154.730222  Root MSE     =    5.8599

```

Appendix II: Result for Multiple linear regression model

```
.reg VMS SEX AGE EDL FSH ExMP ACCR ACDPE AMI CBD LBD
```

```

Source |      SS      df    MS      Number of obs =    132
-----+-----
Model | 16114.7323     10 1611.47323  Prob > F      =    0.0000
Residual | 4154.9268     121  34.338238  R-squared     =    0.7950
-----+-----
Total | 20269.6591     131 154.730222  Root MSE     =    5.8599

```

```
-----
```

VMS	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
-----+-----						
SEX	.0772217	1.332962	0.06	0.954	-2.561729	2.716172
AGE	.0077536	.0714855	0.11	0.914	-.1337708	.149278
EDL	.9121069	.240091	3.80	0.000	.4367835	1.38743
FSH	-.0817044	.4802163	-0.17	0.865	-1.032419	.8690105
ExMP	.6219357	.1699156	3.66	0.000	.2855429	.9583286
ACCR	3.665282	1.273851	2.88	0.005	1.143358	6.187207
ACDPE	6.270893	1.391311	4.51	0.000	3.516426	9.025361
AMI	-.2821745	1.078939	-0.26	0.794	-2.418218	1.853869
CBD	4.091385	.6236659	6.56	0.000	2.856674	5.326096
LBD	2.739255	1.165861	2.35	0.020	.4311258	5.047385
_cons	9.232626	2.959105	3.12	0.002	3.374297	15.09095