

**ST. MARY’S UNIVERSITY SCHOO OF GRADUATE STUDIES**

**DETERMINANTS OF MILK MARKET PARTICIPATION OF SMALL DAIRY FARMERS IN SULULTA TOWN IN OROMIA REGIONAL STATE, ETHIOPIA**

BY

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JULY, 2022

 ADDIS ABABA, ETHIOPIA

**A THESIS SUBMITTED TO ST.MARY’S UNIVERSITY, SCHOOL OF
GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF MASTER OF ART DEGREE
IN DEVELOPMENT MANAGEMENT**

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**DECLARATION**

I hereby declare that this thesis entitled “DETERMINANTS OF MILK MARKET PARTICIPATION OF SMALL DAIRY FARMERS IN SULULTA TOWN IN OROMIA REGIONAL STATE, ETHIOPIA” is my original work, has not been presented for degrees
in any other University and all sources of materials used for the thesis have been duly
acknowledged.

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**ENDORSEMENT**

This thesisis submitted to St. Mary’s University, School of Graduate Study for open defense examination with my aproval as an advisor.

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 **APPROVED BY BOARD OF EXAMINERS**

As members of the examining board of the final M.Sc. thesis open defense, we certifythat we have read and evaluated the thesis prepared by Tacher Haile,entitled “DETERMINANTS OF MILK MARKET PARTICIPATION OF SMALL DAIRY FARMERS IN SULULTA TOWN IN OROMIA REGIONAL STATE, ETHIOPIA" and recommend that it to be accepted as fulfilling the thesis requirement for Master ofArt degree in Development Management.

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# ACKNOWLEDGMENT

First and foremost, I would like to praise my GOD, for His mercy, love and grace which enabled me to succeed throughout my life.

I would like to express my sincere gratitude and special respect to my thesis advisor Dr. WondimagegneChekol (PhD) for his unwavering support, suggestions, guidance and overall encouragementduring this journey**.**

I greatly acknowledge the small dairy farmers in Suluta townfor their kind cooperation in providing us with the necessary information.

Finally, I would like to thank all my parents who supported me with love and understanding and also would like to thank everyone who played a significant role in my educational accomplishment.

# ACRONYMS

CSA........................................... Central Statistics Agency

FAO ...........................................Food and Agriculture Organization

OR.............................................. Odds Ratio

SSA .........................................Sub-Saharan Africa

UNDP...................................... United Nation Development Program

WHO .........................................World Health Organization

# ABSTRACT

*Though Sululta town have potential for dairy production in Ethiopia, the majority of small dairy farmers could not get benefit from this sector due to the low market participation problem. Hence, this study was designed to examine the determents of milk market participation of small dairy farmers in Sululta town in Oromia Regional State, Ethiopia. Data from 95 sampled small dairy farmers were employeed and analyzed by using descriptive statistics and logit model. The result of the study showed that 55.75% of the sampled dairy farmers were participated in the milk market while 44.25% of them did not participate in the milk market at the time of this study. The model result shows that the likelihood of being participating in the milk market was higher among dairy farmers whose household head is educated, who owned a larger number of both cross breed and local cows, who produce a larger volume of milk per day, who have access to marketing information, who have access to dairy extension services, and dairy farmers who have market linkage. On the contrary, the likelihood of participating in the milk market was lower among dairy farmers who had higher household sizes and higher non-dairy income. From this it is concluded that demographic factors of the household head, economic factors of the household and institutional factors plays significance role for the small dairy farmers to partcipate in milk market in the study place. Thus, policy recommendations include policy action that promotes the formal education of the dairy farmers, strengthen dairy extension services, increases the volume of milk production via an increasing number of both cross and local breeding cows and policy action that enhance the accessibly of marketing information and market linkage are essential to encourage the market participation of the small dairy farmers in Suluta town.*

**Keywords**: Small Dairy Farmers, Dairy Production,Market Linkage, Socio-Demographic Factors, Socio-Economic Factors Market Participation, Logistic Regression Mode

# CHAPTER ONE

# INTRODUCTION

## Background of the Study

Ethiopia is continually shown as one of the most potential countries in livestock resources in Africa with a projected 70.292 million cattle(CSA,2021). The contribution of livestock sub-sector is an important component in the agricultural activity and has been contributing a large portion to the economy of the country, and still promising to rally round the economic development of the country. According to CSA (2018), Ethiopia possesses 60.39 million heads of cattle, 31.30 million sheep, 32.74 million goats and 1.42 million camels (CSA, 2018). The livestock subsector has an enormous role in Ethiopia’s national economy and livelihoods, contributing about 16.5% of the national Gross Domestic Product (GDP) and 45% of the agricultural GDP (FAO, 2019). It also contributes 10% of export earnings and 30% of agricultural employment (FAO, 2019; Behnke and Metaferia, 2011). The livestock subsector supports and sustains livelihoods of 31 to 48% of households as an income source (FAO, 2019).

Ethiopia holds large potential for dairy development and particularly Ethiopian highlands possess a high potential with diverse topographic and climatic conditions favoring dairying (Gezu and Zelalem, 2018). The traditional smallholder milk production system contributes to 97 percent of the total national milk production and 75 percent of the commercial milk production.

This sector is largely dependent on indigenous breeds of low productivity native zebu cattle, which produce about 400-680 liters of milk /cow per lactation period (Yilma et al., 2011). As dairying play a significant role in the lives of the urban and periurban poor households, promotion of the dairy sector in Ethiopia can, therefore, contribute significantly to poverty alleviation as well as, availability of food and income generation (Yitaye et al.,2007). In addition, a very small number of crossbred animals are milked to provide the family with fresh milk butter and cheese (Getachew, 2015). Surpluses are sold, usually by women, who use the regular cash income to buy household necessities or to save for festival times (Mugerewa et al.,2009).

Despite a large number of livestock and dairy production in Ethiopia, there are a number of
fundamental constraints underly these outcomes. For instance Berhanu et al.(2013) found that factors such as poor marketing infrastructure, limited supply of different inputs (feed, breed, stock, and water), poor or non-existent of extension service, lack of marketing support service, high diseases prevalence, lack of market information, traditional technologies and limited credit
services affect the livestock marketing conditions in Wolaita zone, Ethiopia.

In Oromia regional state, dairy farming remains to be one of the dominant economic sector. the total milk produced in a region is 1,473,195,406 liters. It has the highest share of 44.42% in milk production from the rest all other regions and average daily milk produced is 1.475 litres which is greater than the national level of the country (CSA, 2018). Similarly, Sululta town is well known for milk production. According to (Fekadeselassie and Asfaw ,2017) the town has a capacity of producing from 70,000 to 100,000 liter of milk per day but it is only at the areas near to the collection centers that the producers are able to sell (Fekadeselassie and Asfaw, 2017). The milk marketing channels start from producers and integrate different intermediaries up to
final consumers. The final users of the product are the consumers in Sululta area and at Addis Ababa market. The marketing actors along the chain are producers, wholesalers, dairy cooperative, processors, retailers and consumers. Dispite its huge milk production the structure of the milk market of was strongly oligopolistic (Dessalegn el al., 2021). The top four traders dominating milk markets were Selale dairy cooperative union and three milk processing plants namely Elemtu dairy processing plant, Life milk processing enterprise and Lame dairy processing plant. The traders in Sululta town have mentioned barriers to entry in the milk marketing systems. These were level of trader’s formal education, trade experience, initial capital , seasonality of deman and perishable nature of milk which were used to explain barriers to entry of traders into milk market in the town (Fekadeselassie and Asfaw, 2017).

## Satement of the Problem

Dairying is a means of providing an additional source of income and employment to small and
marginal producers in the country. The smallholders produce about 98 percent of the total milk
production in Ethiopia (SNV, 2008), but it is only small quantity of this production that is marketed in the form of liquid milk; the larger volume is processed into different dairy products for home consumption and sales (Fekadeselassie and Asfaw ,2017). Of the total milk produced, only five percent is marketed as liquid milk due to under development of infrastructure in rural areas (Mohamed et al., 2004). A similar study conducted by Berhanu(2012) revealed that out of the milk produced per year in rural Ethiopia, 6.55 percent was sold in the market, 48.48 percent was home consumed, 0.41 percent was used for wages in kind and 44.56 percent was processed into butter and cottage cheese. Sululta town, where the study focused, is endowed with suitable environment for livestock and dairy production. According to (Dessalegn el al., 2021) most farmers in thestudy area have dairy farms becouse their land is not suitable for agronomicpractices because it has a water loggingproblem (Dessalegn el al., 2021). Sululta woreda contributes the highest amount of milk in Oromia region as well as for the country but there is low participation of milk producers in the market. The milk and milk products are not adequately market-oriented and the competitiveness of smallholder milk producers is limited (Asnakech el al, 2016). Despite a large number of livestock and dairy production in the study place, large number small dairy farmer cannot supply their milk to the market due to different reasons. And those suppliers can only supply a small amount of their total production of dairy (Asnakech el al, 2016). The fundamental factors affecting the dairy market participation are not well addressed. Because of this, most smallholder dairy farmers could not get appropriate income from dairy through sustainable milk and milk products marketing. Thus, it requires deep understanding of those factors that affect dairy farmer from participation in the dairy market. So far to no prevous studies have been carried out to analyze the determinant of milk market paricipation of small dairy farmer in Sululta town. A number of researches that were conducted in same study place such as, Value chain and quality of milk in sululta and welmera weredas by (Mustefa ,2012) that showed the hygienic conditions of milking and storage processes, transferring of milk into different containers and sieves, unclean milk equipments were basic determinants of milk quality the study place; Technical effieiency of commercial dairy farms in Sululta town by (Mekdes and Wondimagegn ,2017), that shows there was a significant inefficiency in milk production in the study area were due to breeding method, feeding method, milking method, housing system & experience; Analysis of Structure, Conduct and Performance of Cow Milk Market In Sululta Woreda, Ethiopia by (Asnakech el al, 2016), that showed the woreda milk market is highly oligopolistic nature with concentration ratio of 87.16% which was dominated by four traders including dairy cooperative union and three processing plants and this study was done at woreda level that include all milk producer and trader both in urban and non urban areas of Sululta woreda; Technical Efficiency of Smallholder Dairy Farmers in Urban Ethiopia: The case of Sululta town by (Dessalegn el al., 2021), that showed the number of crossbreed cows, concentrate, roughage and labour have a significantly and positively influencing on the average level of milk output and Assessmet of integrated milk value chain and credit service participation of milk producers in ethiopia: The case of sululta area dairy value chain by (Fekadeselassie and Asfaw, 2017), that showed the major actors participated in the milk value chain were producers, wholesalers, cooperatives, retailers, processors and consumers with the higher producers marketing margin of 61.3% for the channel that passes through cooperatives were reviewed by the researcher. However none of these studies have empirically investigated the determinants of milk market participation of small dairy farmers in Sululta town. Therefore, this research tried to fill this gap by providing additional knowledge about the the determinants of milk market participation of small dairy farmers in Sululta town.

## Research Questions

The study aimed to answer the following core research questions:

1. Which demographic factors affects the small dairy farmers from participating in in Sululta town?
2. What are institutional factors areaffecting thesmall dairy farmers from participate in milk marketin Sululta town?
3. What kind of economics factors are affecting the small dairy farmers from participate in milk market in Sululta town?

## Objectives of the Study

**General Objective**

The general objective of this study is to examine the determint of milk market participation of small dairy farmers in Sululta town in Oromia Regional State, Ethiopia.

**Specific Objectives**

* + - 1. To examine the demographic factors if dairy farmer household affects milk market participation of small dairy farmers
			2. To examine the institutional factors associated with milk market participation of small dairy farmer
			3. To examine economic factors associated with milk market participation of small dairy farmer

## Significance of the Study

Understanding the determinants of milk market participation and constraints of a small dairy farm for participating in the milk market isvery essential for policymakers, government actors, NGOs, and other stakeholders to support, encourage, and promote the sector through minimizing the factors obstructing the growth of milk market participation. This finding will be helpful for a better understanding of the determinate factor associated with the market participation of small dairy farmers. It will also help policymakers in designing appropriate policies and strategies for intervention. The outcome of this study is also believed to be useful for dairy producers to make better decisions about how to prticpate in milk market as well as a stakeholders that are engaged in the development of this sector. Finally, the findings and conclusion for this study will be used as the basis for further research on the area targeting marker participation of small dairy farmers.

## Organization of the Paper

The thesis is organzed with five chapters. chapter one contains introduction, background of the study, statement of the research problem, Chapter two contains both theoretical and empirical literature reviews. Chapter three describes the research methodological issues of the study and chapter four shows the data presentation interpretations and discussion of the study. Finally, conclusions and recommendations of the study are presented in chapter five.

#

# CHAPTER TWO

# LITERATURE REVIEW

## Theoretical Literature

Market participation in smallholder farming has gained priority in the developing world as an engine for economic growth. This prioritization of smallholder farming has been reflected in the policy agenda of many developing countries (Demeke and Haji, 2014). 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.

Developing country governments are directing efforts to improve market access, expecting a significant return in meeting Sustainable Development Goals (SDGs) of poverty reduction and zero hunger anticipated by 2030 (MFPED, 2016). Interventions aimed to increase market participation and product sales in Sub-Saharan African countries are therefore major strategies that need to be addressed to take advantage of the projected increase in demand for agricultural products, especially livestock. For agro-based economies such as Ethiopia (80% agrarian) market development is crucial for the increasing population and urbanization. However, many households face a major constraint of inability to participate in markets, which makes it impossible to combat poverty. Despite the Ethiopian government's efforts to transform the agriculture sector, many farmers remain largely in subsistence farming with a little level of commercialization. Lack of smallholder dairy market participation has been reported as a major constraint to poverty reduction in Ethiopia. Efforts to improve livestock products market sales are therefore paramount to the Ethiopian economy as they lead to increases in productivity and sale (supply) of agricultural (livestock) products. Without the stated interventions, Uganda may fail to take advantage of the anticipated increase in demand for livestock products.

Intensification of livestock production with stronger market participation of smallholder farmers is generally promoted as an important pathway to secure food supply to growing urban markets in developing countries (Paul et al., 2018; Reardon et al., 2014). Where pressure on land increases, following population growth and urbanization, it is considered essential to focus on increasing output per unit of land (Akinlade et al., 2016). Intensification of production per unit of land is associated with increased utilization of external inputs and services,with the aim of growth in marketable surplus (Barrett *et al.,* 2012;Duncanet al., 2013). This trend towards commercialization of production usually leads to farm specialization and requires increasingmarket orientation, market participation and business skills (Akinlade et al., 2016; Udo et al., 2011).

Various authors indicate that in smallholder dairy farming systems, greater market participation is not only inﬂuenced by production level factors, but also by market access (Omitiet al., 2009; Poulton*et al*.,2010). Ever since the von Thünen's paper about the “isolated state”,proximity to urban end-markets for agricultural produce has received ample attention in attempts to understand the market participation of remote farmers (Chamberlin and Jayne, 2013; Marino et al., 2018;

Oosting et al., 2014). In many cases, however, von Thünen'sproximity to end-market does not adequately explain intensification and market participation patterns observed, as recently shown by Migoseet al.(2018); neither do analyses using travel costs nor travel time to end markets as a proxy for market access transaction cost (Minten et al.,2018). As Nanyeenya et al. (2009) stated, proximity to markets for inputs and services requires attention as well, especially where intensification of land use leads to increased use of inputs and services that need to be obtained from local service centers.

**2.1.1 Milk Production Systems in Ethiopia**

Ethiopia has the largest inventory of livestock in Africa. However, its productivity and commercialization remains low (Mebrate et al.,2019). In Ethiopia, dairy production system is broadly classified into three as rural, urban and peri-urban dairy production systems based on location of operation (Tadele et al.,2021). The urban and peri-urban dairy production system is characterized by market-oriented production system with commercial nature of dairy farming
activities. In this system, high grade dairy cows are mainly used to produce and sell raw milk through different milk marketing channels. Although the urban and peri-urban dairy production system usually enjoy an advantage of better market access for milk and milk products, they also face milk marketing problems in practice(Tadele et al.,2021). Pastoral dairy farming system is one of the sustenance farming practices that promotes up to 98% of the entire milk manufacture in Ethiopia, and includes pastoralists, agro-pastoralists and mixed crop-livestock manufacturers (Guadu & Abebaw, 2016). The traditional (smallholder) dairy farming system, which is dominated by indigenous (local) breeds, added up to 97%–98% of the whole annual milk yield in Ethiopia (Bereda et al., 2014). However, over 85% of the milk manufactured by pastoral household is utilized within the pastoral families with the proportion being marketed less than 7% due to its greatest benefit for children's general well-being, strength and development (Gobena, 2016). The level of excess milk is determined by the potential to produce milk in terms of herd size and production season. The collected milk is mainly processed using traditional skills and the processed milk outputs such as butter, ghee, ayib and sour milk are commonly sold through the low-priced market after the households meet their requirements (Tekea, 2021).

**2.1.2 Urban Milk Production System**

Urban dairy systems focus on the production and sale of fluid milk,with little or no land resources, using the available human and capital resourcesmostly for specialized dairy production under stall feeding conditions. As compared to other systems, they have relatively better access to inputs (e.g. feeds) and services(e.g. artificial insemination and clinic) provided by the public and private sectors, anduse intensive management (Tegegneet al., 2013). In most towns of Ethiopia, the urban dairy cattle production systems are practiced with little or no land resources for the production and sale of milk (Azage et al.(2013). It is the most market oriented dairy cattle production system compared to other production systems (Asrat et al.,2016). Urban areas producers use crossbred, as well as high grade, dairy animals. However, only 1% of the dairy cattle from the total population of dairy cattle of the country are kept under urban dairy cattle production system (Gezu et al., 2018). Cattle are housed in improved shelters made of locally available materials (Bekele et al., 2018). Concentrates, roughages and non-conventional feeds are the main feed resources which are used in urban dairy cattle production system. Moreover, road side grazing, fruits of plants and wastes also used in urban dairy cattle production system (Asrat et al.,2016). Similarly, the study conducted by (Gebeyew et al., 2016) showed the main feed resources in Dawa chefa districts were grazing land, sun dried hay, agro-industrial oil seed cakes, crop residues and concentrates

**2.1.3 Peri-Urban Milk Production System**

The peri-urban dairy cattle production systems are mainly located at the edge of the town areas which have comparatively better access to urban centers in which dairy cattle products are extremely wanted (Azage et al.(2013). This production system is categorized as semi-intensive crop-livestock farming system. Most of the dairy cattle producers depend on hybrid cows and they practiced supplementary concentrate feeding. As related to the rural dairy cattle production system, peri-urban dairy cattle production systems is typically located along roads within reasonable distance to urban centers and keepers are involved in fluid milk market Nigatu et al, 2012). Furthermore, According to Tegegneet et al. (2013), the Per-urban milk production system is located at the periphery of major towns which have relatively better access to urban centers inwhich dairy products are highly demanded. Similarly, Mebrate et al.(2019) reported that per-urban milk production system is developed in areas where the population density is high and agricultural land is shrinking due to urbanization. Similar to the urban dairy production system, in this system milkproduction, in general, is mainly based on cattle (Tegegneet al., 2013).

**2.1.4 Rural Milk Production System**

The highest source of milk in Ethiopia is traditional dairy cattle production while cattle are kept for drought power without giving any focus to improve the milk production potential of the dairy cattle and focuses on butter production rather than fluid milk (Alemayew et al., 2012). From the total national milk production, 97 percent comes from rural milk production system which is produced by smallholders. The rural milk production system is highly reliant on the low productivity of the indigenous zebu cattle breeds that can produce 400–680 liters of milk per cow per lactation period (Zelalem et al., 2011). The main feed resources for dairy cattle in rural areas are natural pasture, cop residues, crop aftermath or stubble grazing, improved forages with their minimal contribution and beverage by-products that are produced locally such as Diqi or atela (Kasahun et al., 2015)

**2.1.5 System of Milk Product Marketing**

In Ethiopia, fresh milk, butter, fermented or soured whole milk (ergo), cottage cheese (ayib) and buttermilk (arera) are both formally and informally marketed. The informal milk marketing system is dominant, accounting for 95% of the milk marketed in the country. Producers directly sell their products to consumers or unlicensed traders or retailers through mutual price negotiation Anteneh B. et. al. (2010). There is no license to operate and no checks on quality in the informal system Yilma Z. et. al.(2010). The formal marketing system prevails in peri-urban and urban areas. Milk is collected from producers by cooperatives and private collecting and processing plants, which channel the products to consumers, caterers, supermarkets, and retailers (Tegegne Z. et. al.(2013, Anteneh B. et. al.,2010). Under the formal system, the quality of the milk is tested on delivery Yilma Z. et. al.(2010). In some urban areas where milk collecting cooperatives or milk processing plants are absent, such as Bako and Nekemte towns of Oromia in western Ethiopia, the marketing system is informal (Geleti D. et. al.2014). In pastoral and agro-pastoral areas of eastern Ethiopia, milk from both cows and camels is sold in raw form through the informal marketing system (Tegegne Z. et. al.2013). In these areas, cow milk is processed into butter, and the sale of soured milk and butter accounts for about 10% of the total milk market, while camel milk processing to other dairy products is less common. Besides raw milk, soured milk is also marketed in pastoralist areas like Borena in Oromia. Milk and other dairy products are generally marketed in towns and marketplaces. Season and distance from the main towns affect the price, with the price being higher during dry season and closer to towns where demand is high Anteneh B. et. al.(2010).. Milk is transported from the local market places to the nearby towns by donkeys and light trucks (Tegegne Z. et. al.2013).

##  Empirical Literature Review

Previous studies in East African countries and India showed that the decision bydairy farmers on their choice of milk marketing channel is influenced by majorfactors that could be categorized as producers characteristics such as age,education level, farm experience, and labor availability; farm characteristics suchas farm size, number and types of cows, the volume of milk produced, location ofthe farm; and institutional factors including extension, credit and marketinformation services, and market channel-related factors including price and modeof payment, and their distance from the producers' village (Berem et al., 2015;Berhanu et al., 2014; Huang et al., 2012; Innocent et al., 2018; Ishaqet al., 2017;Mengistuet al., 2016; Mohammed et al., 2020).

A study done in Wolaita zone by Berhanu K. et al (2014) showed that around 59.4%, of the milk produced per day was supplied to the market and the age of household head, experience, milk yield, number of milking cows owned and land size affect the household’s milk market participation. And also, family size, milk yield, and experience significantly affected the volume of milk supply.

A recent study conducted by Gemechu O. et al (2021) showed education, number of milking cows, credit and membership of dairy cooperatives have a positive and statistically significant effect on the level of milk market participation of dairy farmer in Ada berga district in Ethiopia.

A study conducted by Ali T. et al (2017) in Dessie ZuriaDistrict,SouthWollo Zone of Ethiopia showed that both decision of participation and level of participation of households in milk market supply were affected significantly by age of the household, educational level, number of milking cows owned, distance from market/urban centres and technical training. The decision of participation of households in milk market supply was also affected significantly by access to credit whereas the level of participation was affected significantly by sex of the household, family size and access to market information.

A study conducted in Uganda by Elizabeth and Emmanuel (2019) showed that milk market entry decision was significantly influenced by improved lactating cows,the number of lactating cows, milk yield, information access, access to veterinary services and children less than 6 years. Also, percentage of milk sales by the dairy farmer was influenced by information access,the number of lactating cows, improved milking breeds and quantity of milkconsumed by the dairy farmer.

Research conducted by Woldemichael (2008), with the objective of analyzing dairy marketing chains in the Hawassa, Shashemane and Yergalemshowd that dairy household’s market participation decision was affected by age of the household head, family size, education level, experience in dairy production, number of crossbreed milking cows owned, and distance from the milk markets center.

Market Participation idea in agriculture has been described differently by various authors. Market participation is integrating farmers into the inputs and output markets to increase production, earnings and decrease poverty (Otekunrin et al., 2019). Any market participation goal is addressing the question of whether or no longer a household is better off participatingin the market. Household market participation decision is tested primarily based on the perceived utility from any option by minimizing transactions cost (Muricho et al., 2015). Smallholder farmers produce dairy to fulfilltheir physiological wishes of feeding, and/or to collect extra wealth through commercializing theiractivities and make certain decisions about what kind of dairy(s) to produce, how much to be produced, when and where to sell or market the productswhich would result into most satisfaction from their labor in terms of returns.

For this study, the researcher developed a conceptual framework based on the reviewed literature to analyze the determinants of Milk market participation of the dairy farmer in Sululta town.The predictor variables are categorized into three dimensions that is socio-demographic dimension, economic and milk production dimension, and institutional dimension. And to estimate the effect of the independent and dependent variables, the logistic regression model is used.

Figure 2. 1The Conceptual Framework of the Study

Source:(Own developed based on reviewed literature2021)

# CHAPTER THREE

# RESEARCH METHODOLOGY

## Description of the Study Area

Sululta district is one of the six districts of Oromia Special Zone Surrounding Addis Ababa in Oromia Regional State. It is situated very close to the district capital town Chancho and Addis Ababa, which are far about 15 and 23 km in the north and south direction, respectively. Astronomically, it is located between 9° 30′ 00″ N to 9° 12′ 15″ N latitude and 38° 42′ 0″ E to 38° 46′ 45″ E longitude. According to CSA (2012), population of district was estimated at about 149,494 (male 74,753 and female74,741). Concerning the land use pattern, out of the total area of the district which is109,269 ha, about 26,662 ha (24.4%) is cultivated land, and 15,145 ha (13.9%) iscovered by forest, bush and shrubland, 38,720 ha (35.4%) is grasslands, and 28,742(26.3%) are other land use types (SulultaWoreda Rural and Agricultural Development Office ,2015)

The topography of the area varies from chains of mountains around Entoto ridge in the south to plain lands in the East, North-west, and north. Slope is also another topographical aspect that influences the land use planning and management. The steepest slope in the area is situated in the elevation range of 2640m to 2800m almost around the southern ridge of Entoto and north-eastern fringes. By implication high run off and lateral erosion is high in these areas compared to the gentle slope locations. The gentle slope lies mostly in the central part of the study area within 2580m to 2700m altitude where the existing built up area lies. The flat area of the town is found in the altitude of less than 2580m in the east and north-west of the study area. This area is one of the likely water logging area during the rainy season and potential grazing land in dry season(Tamiru Tolcha, 2021)



Source (Tamiru Tolcha, 2021)

Figure 3. Map of Study Area

## Research Design

For this study a explanatory research design that followed a cross-sectional survey was employed. Furthermore, in order to achieve the intended objectives, quantitative methods were employed to capture data for the purpose of deep analysis and understanding of the determinants of milk market participation of small dairy farmers in the study area. Since the nature of the research is a cause and effect relationship explanatory research design is the most appropriate design to examine the relationships between demographic factors of the household head, economic factors the household as well as institutional factors and the milk market participation of small dairy farmers.

## Sample Size Determination and Sampling Techniques

The sample size of this research is calculated by using Taro Yamane (1967) sample size determination formula with 95% confidence level. Such a method is the most appropriate way of sample size determination for a finite population (Yamane, 1967). This is presented as follow

Where,

is the sample size,

 is the population size of samllholder in dairyfarmers in Sululuta town and

 is the acceptable margin of error.

Therefore, the sample size is calculated as

Therefore, 95 small dairy farms holder were then randomly selected from Sululta town and questioned about their farm information were collected.

## Sampling Techniques

A cross-sectional study involvedpurposive selection of study areas, but a random selection of dairy farms was conducted. The study areas were purposively selected as they have a high potential fordairy production. Once the sample size was determined the next step was determining the appropriate sampling technique. For this study,a simple probability random sampling technique specifically lottery method was used to select 95 small dairy farmers from the total of 125 small dairy farmers in Sululta town. Simple probability random sampling technique was appropriate because each dairy farmer’s in the population becouse each dairy farmer has an equal chance of being selected from the total population(Creswell, 2009).

## Method of Data Analysis

The data from the survey questionnaires were analyzed quantitatively. To describe the demographic profile of the respondents, frequencies , percentages were calculated. The responses on the independent and dependent variables were summarized and described using the central measure of the tendency of mean and standard deviation for measuring variability as well as chi-square analysis were employed to compare the milk market participant from the non participants small dairy farmers. Econometric model specifically , binary logistic regresuion model was employed to examine the determinants factrors associated with of milk market participation of small dairy farmers.

### 3.6.1 Descriptive Analysis

The quantitative data collected via semi structured questioner were tabulated according to their frequency and percentage and then analyzed accordingly using SPSS (Statistical Package for Social Sciences) version 23 software.

### 3.6.2 Econometric Model

In this study, the small dairy farmer was asked whether he/she is participating in milk market or not. This was analyzed with a binary logit model.

**The binary Logit model:**For a binary response and a quantitative explanatory variable, and . Let denote the success probability when take the values .The problem with the linear model is that the probability mode (where is the vectorof parameters to be estimated) is used to approximate a probability value within the interval 0 and 1, while is not to be constrained. Therefore, we apply the logit transformation where the transformed quantity lies in the intervaland it is modeled as

The probability of success can be expressed as

Where the parameter determines the rate of increase or decrease of on the log of odds that, controlling for other variables.Furthermore, is the multiplicativeeffect on the odds of a unit increase in , at a fixed level of other Xs (John and Forrest,1984).

With further rearrangement, we obtain the odds of success.

The above three equations give suitable representations of log-odds, the success probability, and
odds, respectively. Indeed, these representations facilitate interpretations of parameter estimates.
The parameter refers to the effect of xi on the log odds that Y = 1, controlling the other X's.

**3.6.2.1 Goodness of Fit of the Model**

The goodness of fit or calibration of a model measures how well the model describes the data.
Assessing goodness of fit involves investigating how close values predicted by the model are to the observed values. For likelihood-based models, the Hosmer and Lemeshow test is one of the most commonly recommended tests for the overall fit of a binary logisticregression model (Hosmer &Lemeshow1980).

**3.6.2.2 Model Diagnostics**

The model adequacy checking is the main step of regression analysis after a model fit. It can measure based on diagnosing residuals and measure of influence. The most commonly used model diagnosis.

**Leverage Values (Hat Diagonal)** is a measure of how far an observation is from the others in terms of the levels of the independent variables (not the dependent variable). Observations with leverage values larger than one are considered to be potentially highly influential (Belsley et al., 1980).

**DFBETAS** measures how much observation has affected the estimate of a regressioncoefficient (there is one DFBETA for each regression coefficient, including the intercept). IfDFBETAs is less than unity, this implies no specific impact of an observation on thecoefficient of a particular predictor variable, while DFBETA of a case greater than 1.0, andimplies the observation is an outlier (Cook and Weisberg, 1982).

**Cook’s D** is a measure of the aggregate impact of each observation on the group of regression coefficients, as well as the group of fitted values. In logistic regression, a case is identified as influential if its Cook's distance is greater than 1.0 (Cook, R. D., 1998)

## Study Variables

### 3.7.1 Response Variable

The dependent variable of this study is the milk market participation of the small dairy farmers. That represents the probability of milk market participation of the household. The variable takes value 1 for household thatparticipates in milk market whereas it takes the value zero for household does not participate in milk market. Why you make participation as dummy (participate or not)? Why not you measure it in Likert scale?

### 3.7.2 Explanatory Variables

The predictor variables expected todetermine milk market participation of the small dairy farmers are listed in the below table.

Table 3.1Description and Measurement Types of Explanatory Variables

|  |  |  |  |
| --- | --- | --- | --- |
|  No | Explanatory Variables | Measurement Type | Expected Sign |
| 1 | Sex of Household Head | Dummy( 0= Female , 1= Male) |  +/- |
| 2 | Age of Household Head | Categorical (0= 15-24 years(Ref.), 1= 25-34 years, 2 = 35-44 years, 3 = 45-54 years, 4 = 55 - 64 years , and 5 = 65 years and above)  |  +/- |
| 3 | Marital status of Household Head | Categorical ( 0= unmarried(Ref.) , 1= Married, 2=divorced/widowed) which one is your reference category |  +/- |
| 4 | Education Status of Household Head | Categorical ( 1= illiterate(Ref.) , 2= Grade 1-8, 3 = Grade 9-12 , 4= Certificate , 5= Diploma,6 = Degree and 7= Masters and above) which one is your reference category |  + |
| 5 | Experience in dairy farming in years | Continues variable |  +/- |
| 6 | Household Size | Continues variable | +/- |
| 7 | Number of Milk Cows | Discrete | + |
| 8 | Number of Cross breed cow | Discrete | + |
| 9 | Number of local breed cow | Discrete | + |
| 10 | Total milk production in liters per day | Continues variable | + |
| 11 | Total milk Sold in liters per day | Continues variable |  |
| 12 | Access to Market Information | Dummy( 0 = No(Ref) , 1=Yes) | + |
| 13 | Access to dairy extension services | Dummy( 0 = No(Ref) , 1=Yes) | + |
| 10 | Non-farm income | 1 if a farmer participate in nondairy farm income, 0 otherwise Participation in that particular year or all the time? | + |
| 11 | Market Linkage | Dummy( 0 = No(Ref) , 1=Yes) | + |

Source (Own Survey, 2021)

## Multicollinearity Assumption

In this study, the multicollinearity of the independent variables were assessed based on, tolerance and variance inflation factor (VIF) index. If the tolerance value is less than some cutoff value, usually 0.2, the independent should be dropped from the analysis due to multicollienarity. The VIF is the reciprocal of tolerance and when the values of VIF >10, then there is a problem of multicollinearity.

## Homoscedasticity Assumption

Homoscedasticity describes a situation in which the error term that is the “noise” or random disturbance in the relationship between the independent variables and the dependent variable is the same across all values of the independent variables The violation of this assumption called heteroscedasticity. However, logistic regression does not assume homoscedasticity. Thus the researcher doesnot employed heteroscedasticity test

# CHAPTER FOUR

# DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter is divided into three subsections. Section 4.1 presents the descriptive statistics,
section 4.2 presents econometric results of logistic regression model and its diagnostic test results and finally section 4.3 presents discussion of the results of the econometric model.

## Descriptive Analysis

In this section, data obtained from 95 small dairy farmersfor the study is summarized

**4.1.1 Descriptive Analysis of Categorical Independent Variables**

The result and discussion of descriptive statistics of the categorical independent variables are presented as follows

Table 4. 1 Descriptive Analysis of Categorical variables

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** | **Category** |  **Participating in Milk Market** | **Total(N=95)** | **Chi-square test P-value** |
| **No(N=42)** | **Yes(N=53)** |
| Sex of Household Head | Female | 7(16.7%) | 13(24.5%) | 20(21.7%) | 0.25 |
| Male | 35(83.3%) | 40(75.5%) | 75(78.9%) |
| Marital Status of Household Head | Unmarried | 8(19%) | 7(13.2%) | 15(15.8%) | 0.38 |
| Married | 33(78.6%) | 41(77.4%) | 74(77.9%) |
| Divorced | 1(2.4%) | 5(9.4%) | 6(6.3%0 |
| Age of Household Head | 18-30 | 21(50%) | 25(47.2%) | 46(48.4%) | 0.546 |
| 31-40 | 15(35.7%) | 16(30.2%) | 31(32.6%) |
| 41-50 | 5(11.9%) | 7(13.2%) | 12(12.6%) |
| > 50 | 1(2.4%) | 5(9.4%) | 6(6.3%) |
| Education Status of Household Head | Illiterate | 13(31.0%) | 14(26.4%) | 27(28.4%) | 0.045 |
| Grade 1-8 | 16(38.1%) | 23(43.4%) | 39(41.1%) |
| Grade 9-12 | 9(21.4%) | 13(24.5%) | 22(23.2%) |
| Certificate | 4(9.5%) | 3(5.7%) | 7(7.4%) |
| Experience in Dairy Farming | 1-5 Years | 20(47.6%) | 22(41.5%) | 42(44.2%) | 0.315 |
| 6-10 Years | 11(26.2%) | 17(32.1%) | 28(29.5%) |
| 11-15 Years | 7(16.7%) | 4(7.5%) | 11(11.6%) |
| > 15 Years | 4(9.5%) | 10(18.9%) | 14(14.7%) |
| Access to Market Information | No | 13(31.0%) | 31(58.5%) | 44(46.3%) | 0.007 |
| Yes | 29(69.0%) | 22(41.5%) | 51(53.7%) |
| Access to dairy extension services | No | 14(33.3%) | 43(81.1%) | 57(60.0%) | 0.000 |
| Yes | 28(66.7%0 | 10(18.9%) | 38(40%) |
| Non- dairy farm income | No | 15(35.7%) | 22(41.5%) | 37(38.9%) | 0.049 |
| Yes | 27(64.3%) | 31(58.5%) | 58(61.1%) |
| Market Linkage | No | 15(35.7%) | 32(60.4%) | 47(49.5%) | 0.001 |
| Yes | 27(64.3%) | 21(39.6%) | 48(50.5%) |

(Source: Own computation, 2021)

**4.1.1.1 Sex of the household head**

Table 4.1 shows that from the total small dairy farm holder, 20 (21.1%) of them are headed by a female household heads and the remaining 75 (78.9%) households are headed by a male. This indicates that the proportion of male household heads is larger than that of females.

**4.1.1.2 Marital Status of the household head**

As it can be seen from the above Table 4.1, of the sample household it appears that 77.9% of the household head are married and the rest 15(15.8%) and 6(6.3%) household heads were found unmarried and divorced respectively at the time of the survey. This implies that marital status could contribute to difference in production between the married and unmarried respondents in that, a household with a married couple tends to have more labour capital for dairy farming, which is mostly a labour intensive activity when practiced in small scale in Ethiopia.

**4.1.1.3 Age of the household head**

With regards to household head age, the highest proportion of household head was observed among those whose age group was between 18-30 years 46(48.4 percent) followed by age group 31-40 years 31(32.6%) and 41-50 years 12(12.6%).The smallest percentage (6.3 percent) of household head was observed among those whose age group of greater than 51 years. This indicates that majority of them that is about 93.7% of them are below 51 years indicating they are in active working age. This shows most of household head of the small dairy farmer can be actively involved inactivities of participation of milk marketing. Because dairy production and marketingmanagement are labor intensive, it needs to be capable of both physical and mentally.

**4.1.1.4 Education status of the household head**

As indicated in Table 4.1, the educational levels of household head counted that, majority of them 39(41.1%) are educated up to from grade 1-8 followed by illiterate household heads 27(28.4%). The remaining 22(23.2%) and 7(7.4%) of the household head are educated and from have certificate respectively.This implies that the higher illiteracy rate shows the lower the dairy farmers ability to perceive new information or use technologies that improve productivity and quality of their produce, as a result of which decrease their participation of milk marketing.

**4.1.1.5 Experience in Dairy Farming**

It is an important variable of intellectual capital measured by the number years the farmer
engaged in activities of dairy farming.As is stipulated in Table 4.1, of the total small dairy farmers, 42 (44.2%) of them have work experience between [1-5 years], 28 (29.5%) of them have dairy farming experiences between [6-10 years], 11 (11.6%) of them have dairy farming experiences between [11-15 years] and the remaining 6(6.3%) of them have dairy farming experiences for more than 15 years. This implies that most of the respondents have work experience between 1 to 5 years followed by having dairy farming experience from 6 - 10 years. From this we can conclude that majority of study participant are experienced in dairying for a long period of time.

**4.1.1.6 Access to marketing information**

Access to marketing information is an intrinsic element of any marketing activity. In this study to examine the accessibility of milk marketing information the sampled small dairy farmers were asked if they have access to market information.Accordingly from the total sample of small dairy farmers, 53.7% of them replied that they have access to marketinginformation and the rest46.3 % replied that they don't have access to marketing information and selling their milk without any marketing information.

**4.1.1.7 Access to dairy extension services**

Access to dairy extension service is an intellectual capital which enhances the producers’
skills in dairy productivity and quality. Agricultural extension is an important service
delivered by the government or NGOs. It is crucial for the development of livestock and milk
production and genetics improvement through (AI) service delivery.In this regard dairy farmer were asked if they have access to dairy extension services and of the total 95 sampled dairy farmer, 57(60%) of them replied that they don't have access to dairy extension service and the remaining 38(40%) of them replied that they have access to dairy extension service. This infers that majority of the sampled dairy farmer do not get a chance of extension services. Despite its benefit for the farmer extension services was give the attention it deserved in the study place of this research.

**4.1.1.8 Non- dairy farm income**

The above Table 4.1 also shows that from the total small dairy farmers, 58(61.1%) of them have income source in addition to their dairy farming activity and the remaining 37 (38.9%) them do not have additional income and their households income is depends on their dairy farming.

**4.1.1.9 Market Linkage**

To explore the availability of market linkage the sampled small dairy farmers were asked to fill questions regarding the availability of market linkage on the questionnaire. And from the total sample of small dairy farmers, 47(49.5%) of them replied that they don't have market linkage and the rest 48(50.5%) of them replied that they have market linkage. This implies that majority of the small dairy farmer had market linkage in the study place so that they can attract larger milk buyers, access larger markets, negotiate stronger prices, and reduce transaction costs to enhance economies of scale.

**4.1.2 Descriptive Analysis of the Continues Independent Variables**

Table 4. 2Descriptive Statistics of Continues Variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Household Size | 95 | 2 | 9 | 4.46 | 1.668 |
| Number of Milking Cows | 95 | 3.00 | 9.00 | 5.2211 | 1.15020 |
| Number of Cross breed cow | 95 | 1.00 | 4.00 | 1.9263 | 1.02357 |
| Number of local breed cow | 95 | 1.00 | 6.00 | 3.2947 | 1.33587 |
| Total milk production in liters per day | 95 | 3.00 | 13.50 | 7.8000 | 1.78558 |
| Total milk sold in liters per day | 95 | .90 | 4.05 | 2.3400 | .53567 |
| Valid N (listwise) | 95 |  |  |  |  |

(Source: Own computation, 2021)

It can be observed from Table 4.2 that the average household size of the dairy farmer is 4.46 which is rounded to 5 household sizes with a minimum and maximum of 2 and 9 household sizes respectively. The larger family size is assumed to increase the consumption of milk which has a
negative impact on the participation of milk marketing, particularly; if household members
are small children. On the other hand, the larger family size has a positive contribution on
participation inmilk marketing because they contribute more labor on production and
management.The result of the descriptive analysis also reveals that the average number of milking cows of the sampled dairy farmer is 5.2 with a minimum of 3 milking cows and a maximum of 9 milking cows. In addition to this Table 4.2 furthermore reveals that of total milking cows they own on average 4 and 6 of their milking cows are breeding cows and local cows. This indicates the sampled dairy farmer hasmore local cows than the breeding cows.The breeding milking cows are associated with a high cost of buying and producing more milk.Regarding the milk production and milk selling the average daily milk production per day per dairy farmer is 7.8 liter with the minimum of 3 liters and a maximum of 13.5 liters. From this milk production on average 2.3 liter per dairy farmer is supplied to the milk market with a minimum of 1 liter per farmer and a maximum of 4.45 liter per farmer. The reason for lower litter supply for the market will be associated with that the farmer may sellthe milk in the form of butter and cheese as well as most of these farmers own local(indigenous) breed cows ,which have low milk production performance.

**4.1.3 Number and Percentage of Dairy Farmers who participated in Milk Market**

As shown in figure 1 above, from the total sampled dairy farmer 55.75% of them are participated in milk market and the remaining 44.21% of them are not participated in milk market. This indicated that the majority of the sampled small dairy farmer isparticipated in the milk market.

Figure 4. Number and Percentage of Dairy Farmers who participated in Milk Market



(Source: Own Computation, 2021)

1. Results of Binary Logistics Regression

Multiple logistic regression analysis was used to identify the effect of each predictor variable on the milk market participation of the dairy farmer. Since the response variable is binary meaning zero or one, with one being participated in the milk market and zero otherwise.

### 4.2.1 Parameter Estimation

The parameter estimation analysis was done by using SPSS version 23 software package. The estimate of model parameters is presented in Table 4.3.

Table 4. 3 Estimates of Model Parameters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | B | S.E. | Wald | df | Sig. | Exp(B ) =OR |
| Step 1a | sex(1) | 1.100 | .773 | 2.025 | 1 | .155 | 3.005 |
| Age |  |  | 2.271 | 3 | .518 |  |
| Age(1) | -2.989 | 2.122 | 1.984 | 1 | .159 | .050 |
| Age(2) | -2.448 | 1.928 | 1.612 | 1 | .204 | .086 |
| Age(3) | -1.004 | 1.573 | .407 | 1 | .523 | .366 |
| Martial\_Status |  |  | .854 | 2 | .653 |  |
| Martial\_Status(1) | 1.025 | 1.542 | .442 | 1 | .506 | 2.786 |
| Martial\_Status(2) | .336 | 1.351 | .062 | 1 | .804 | 1.399 |
| Education |  |  | 2.686 | 3 | .443 |  |
| Education(1) | .107 | .401 | 7.634 | 1 | .000 | 1.185 |
| Education(2) | .719 | .305 | 5.549 | 1 | .018 | 2.052 |
| Education(3) | .782 | .306 | 6.527 | 1 | .011 | 2.185 |
| Experience |  |  | 3.908 | 3 | .272 |  |
| Experience(1) | 1.243 | 1.631 | .581 | 1 | .446 | 3.465 |
| Experience(2) | 2.292 | 1.537 | 2.225 | 1 | .136 | 9.896 |
| Experience(3) | .793 | 1.438 | .304 | 1 | .581 | 2.210 |
| Household\_Size | -.123 | .044 | 7.802 | 1 | .005 | .884 |
| Number\_breedcow | .621 | .068 | 84.645 | 1 | .000 | 1.862 |
| Number\_localcow | .297 | .064 | 21.346 | 1 | .000 | 1.346 |
| Milk\_production | 1.203 | .069 | 351.889 | 1 | .000 | 3.330 |
| Acces\_Market(1) | 1.666 | .715 | 5.428 | 1 | .020 | 5.292 |
| Dairy\_Extension(1) | 1.001 | .398 | 6.313 | 1 | .012 | 2.720 |
| Non\_Dairy \_Income(1) | -.771 | .249 | 9.593 | 1 | .002 | .462 |
| Market\_Linkage(1) | .804 | .390 | 4.239 | 1 | .039 | 2.234 |
| Constant | -1.155 | 2.712 | .181 | 1 | .670 | .315 |

(Source: Own Computation, 2021)

In the above Table 4.3 the estimated binary logistic regression model fit results sex of household head, age of household head, Marital status of household head, education of household head, Experience in dairy farming, Household size, number of breed cows, number of local cows, milk production, Access to marketing information, Access to dairy extension services, Non- dairy farm income and Market linkage.

From these predictors variables education of household head, household size, number of breed cows, number of local cows, milk production, access to marketing information, access to dairy extension services, non-dairy farm income and market linkage were found to be a statistically significant predictors of milk market participation of small dairy farmer in Sululta town at 5% level of significance.

On the other handsex of household head, age of household head, marital status of household head and experience in dairy farmingwas not significantly predicting milk market participation of small dairy farmers in Sululta town at a 5% level of significance.

The model result further reveals that from the significant predictor variables, education of household head, number of breed cows, number of local cows, milk production, access to marketing information, access to dairy extension services, and market linkage have odd ratios greater than one, which means that these variables are positively predicting the probability of being participating in milk market. On the other hand, predictor variables such as household size and Non- dairy farm income, odd ratios less than one, which means that these variables are negatively predicting the probability of being participating in milk market.

### 4.2.2 Model Checking Techniques

After a model is fitted the next important step is checking its model adequacy, assuming that we
are primarily satisfied with the final model or model contains variables in their correct functional
form. The objective is to look at how closely model fitted responses approximate the observed
responses. It is based on a graphical as well as a statistical points of view. There are numerous stepsinvolved in evaluating the appropriateness, adequacy, and usefulness of the model. First, the overallusefulness was assessed. Second, the importance of each predictor variable was assessed bycarrying out statistical tests of significance of coefficients then, detecting influential observations.

### 4.2.2.1 Goodness of Fit of the Model

The goodness of fit or calibration of a model measures how well the model describes the data.
Assessing goodness of fit involves investigating how close values predicted by the model are to the observed values. The diagnostic test results of the Hosmer-Lemeshow test presented in Table 4.4 below show a chi-square value of 7.447 with a p-value of 0.489 which is not significant showing that there is no difference between the observed and the model predicted values and hence estimates of the model adequately fit the data.

Table 4. 4 Hosmer and Lemeshow Test

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Chi-square | df | Sig. |
| 1 | 7.447 | 8 | .489 |

(Source: Own Computation, 2021)

### 4.2.2.2 Model Diagnostics

The next important step in marginal model building is to perform an analysis of residuals and
diagnostics to study influence of observations. Residuals are used to filter points with outlying
response values. The diagnostic test results for detection of outliers and influential values are presented in Annex. The DFBETAs for model parameters including the constant term and Cook’s influence statistic were both less than unity. DFBETAs less than unity imply no specific impact of an observation on the coefficient of a particular predictor variable, while Cook’s distance less than unity showed that observation had no overall impact on the estimated vector of regression coefficients β. A value of the leverage statistic less than one shows that no subject has a substantial large impact on the predicted values of the model. And none of the observationshas standard and deviance residuals larger than 3 in absolute value. The residuals less than 3 in absolute value show the absence of an outlier observation. Thus, from diagnostic checking,the model is adequate (See Annex).

**4.2.2.3 Multicollinearity Test Of The Model**

Multicollinearity is a situation where several independent variables in a model are correlated. In this study, the multicollinearity of the independent variables was assessed based on, tolerance and variance inflation factor (VIF) index. Tolerance is expressed as 1-R2, where R2 is the multiple R of a given independent regressed on all other explanatory variables. If the tolerance value is lower than some cutoff value, usually 0.2, the independent should be excluded from the analysis due to multicollienarity problem. The VIF is the reciprocal of tolerance and when the values of VIF >10, then there is a problem of multicollinearity. In all cases as showed in the (Table 4.5) the tolerance value for all variables is above 0.2 and the VIF value for all independent variables below the cutoff point indicating no multicollinearity problem in the model.

Table 4. 5 Multicoliniarity Test of The Independent Variables

|  |  |
| --- | --- |
| Parameters | Collinearity Statistics |
| Tolerance | VIF |
| Sex of Household Head | .824 | 1.214 |
| Age of Household Head | .305 | 3.279 |
| Marital Status of Household Head | .722 | 1.385 |
| Education Status of Household Head | .872 | 1.147 |
| Experience in dairy farming in years | .305 | 3.275 |
| Household Size | .887 | 1.127 |
| Number of Cross breed cow | .787 | 1.271 |
| Number of local breed cow | .845 | 1.184 |
| Total milk production in liters per day | .309 | 3.237 |
| Access to Market Information | .722 | 1.384 |
| Access to dairy extension services | .625 | 1.600 |
| Non-dairy farm income | .583 | 1.715 |
| Market Linkage | .580 | 1.724 |

(Source: Own Computation, 2021)

* 1. Discussions of Model's Results

**Education of Household Head**

The above Table 4.3showed thatdairy farmer households headed by household headseducated from grade 1-4 are 18.5% (OR =1.185) times more likely to participate in the milk market than illiterate ones. Likewise keeping the effect of other variablesconstant, dairy farmer households headed by household heads educated from grade 1-8 and certificate holders are 2.052 times and 2.18 times more likely to participate in the milk market respectively as compared to the illiterate household head. This shows that the education status of the dairy farmer household head significantly affects the milk market participation of the dairy farmers in the area indicating that as the education status of household increases the odds of participating in the milk market increases.This result is consistent with result of Gemecho O. et al. (2020), Kebede et al. (2015) and Woldemichael (2008).Specifically, Gemecho O.et al(2020) showed thateducation level of households positively significant affects level milk market participation. This due to education enhances managerial capacity 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 2.2 litres. A study by Kebede et al. (2015) revieled thateducation level of the household head has positive effect on level of market participation in litres milk sale and it is statistically significant at less than 5% probability level. The positive and significant relationship indicates that education improves the dairy household capacity to process production related and market related information, which in turn improves bargaining position. The model output confirms that one formal year education leads the dairy household to increase level of participation in litres of milk sale volume by 0.15 litres.The works of Woldemichael (2008) indicates that addition of one-year formal schooling leads the probability of dairy household milk market participation to rise by about 6%.The result of this study is also in line with the study conducted in Dessie Zuria District in South Wollo zone by Ali T. et al. (2017).In their study Ali T. et al. (2017) found out that as the education level of milk producers household increases by one year formal schooling, the participation decision in milk market supply increases by 0.0223 (2.23%).

**Household size,**

With an increase in one family member in the household, the likelihood of being participating in milk market of a dairy farmer is decreasedby 11.6% (OR: 0.884) at 5% level of significance. This implies the higher the household size the lower probability of a dairy farmer sellingthe milk in the market. This result was in line with the result of the study conducted by Woldemichael (2008) but, in contrary with the result of Ali T. et al. (2017).Woldemichael (2008) showed thatlarger family size provides higher labour to undertake dairy production and management activities easily which in turn increases daily marketable milk volume leading to increased capacity of dairy household milk market participation. The marginal effect of the variable also emphasizes that for every increase in adult equivalent increases the probability of milk market participation decision of the household by 10.1%. On the other hand, the result of Ali T. et al. (2017)study found that family size of a household affected negatively and significantly the level of participation of a household in milk market supply at 10% probability level. This finding indicated that as household size increases by one family member ina household, the level of household participation in milk market supply decreases by 8.889 units.

 **Number of Crossbreed Cows**

The result of model shows that a unit increase in number of crossbreed cow ownership by the dairy farmer their odds of participating in milk market increases by 1.862 (OR=1.862) times. This result is supported by the works of Gemecho O. et al. (2020), Woldemichael (2008) and Gizachew et al. (2005) . A study conducted by Gemecho O. et al. (2020), in Ada’a Berga District, West Shewa Zone, Ethiopia shows that one unit increase innumber of milking cow will increase the volume of milk supply to the market by 1.9 litres. Likewise the result of Woldemichael (2008) showed that a unit increase in cross breed dairy milking cow leads the probability of dairy household milk market participation to rise by 10.2%. Moreover, this result designate that increasing number of quality crossbred dairy cows is an important policy relevant variable in stimulating the smallholder to market entry and benefit from economic transaction.

**Number of Local Cows Owned by the Dairy Farmer**

Number of local milking cows had a positive effect on milk market participation of the dairy farmers. The result of the model shows that with a unit increase in number of crossbreed cow ownership by the dairy farmer their odds of participating in milk market increases by 1.346 (OR=1.346) times.The reason behind might be due to the fact that as the number of milking cows increases, volume of milk produced also increases and the producer tend to supply more milk to the market.Similar finding was observed in the study result of and Gizachew et al. (2005) and Ali T. et al. (2017). A study conducted by Gizachew (2005) on dairy marketing patterns and efficiency in Ada'ha. Liben district in Oromia region identified thatas the number of milking cows increases by one, the probability of volume of milk to be supplied to market increases by 48.07 litres.The findings of Ali T. et al. (2017) indicated that as the number of local milking cows increases by one, the probability of volume of milk to be supplied to market increases by 48.07 litres. However, as shown in the above result the ownership of cross-breeding cows have higher odds of participation in milk market than the ownership of a local cow. And this may be associated with the large milk production performance of cross breeding cows. The study by (Woldemichael, 2008) also showed improved dairy breeds are high yielding compared to local breeds leading to the availability of milk marketable surplus.

**Volume of Milk Production Amount**

The result of the model shows that a one liter increase in milk production will increase the odds of participating milk market by 3.33 times. This result is in line with Gemecho O. et al. (2020). According to Gemecho O. et al. (2020) findings , the volume of milk produced had a positive and significant (P < 1%) association withmilk supply to market. The result ofthis study further shows that a one litre increase in milk produce; will increase milk supply in the market by 0.93 litres.The result of this study is also in line withGetachew M. (2015) who illustratedthat, as milk yield increased by 1 liter, probability of milk market participation increased by 0.1%.

**Access to Marketing Information**

Dairy farmers who have access to marketing information have a 5.299 times higher chance of being participating in the milk market thantheir counterparts. This is because marketing Information access enables a farmer to reach out to distant markets and locate milk demand areas. It also facilitates linkage with many milk buyers hence higher percentage sales. This result agrees with the finding of Getachew M. (2015) who illustrated that, as households accessed to /gets milk market information, probability of milk market participation decision increases by 116% from non-getting/not accessed milk market information dairy producers of households. Goetz (1992) similarly reported a positive relationship between access to information by a household and level of market participation.A study by Elizabeth & Emmanuel (2018) also showed that access to information leads to a 29.08% increases in the likelihood of milk market participation of smallholder dairy farmers in Uganda.

**Access to Dairy Extension Services**

Access to dairy extension services is positively and significantly affected the milk producers’ participation in milk market supply. The result of the model indicated that when the dairy farmer hasaccess to dairy extension services their odds of participating in the milk market is increase by 2.72 times as compared to those who do not have access to dairy extension services.The same result was observed in the study by Holloway and Ehui (2002) who identified that extension visit is directly related to the ability of households’ skill in dairy production, marketing, and value addition to support this result. Similarly, Haregeweyni (2015) found that contact frequency of extension had a positive and significant effect ondairy farming activities.A study conducted by Berhanu et al. (2014) in Dessie Zuria District of South Wollo Zone, Northern Ethiopia showed that the likelihood milk market particpation of the dairy farmers increses by 25.54 percent when have access to dairy extension services as comperd to those dairy farmer who do not have acces to dairy extension services.

 **Non- Dairy Farm Income**

Non -dairy farm income of dairy farmersin the study are negatively influences their likelihood of being participation in milk market. The result of the logistic regression shows that the odds of participating in milk market decreased by 53.8 percent for a dairy farmer with better income from non-dairy farming activity. This is because as their got income from other sources their willingness to sell their milk decrease and they prefere to consume the milk producted for them self. This is in line with the finding of study conducted in Zambia by Namulindwa (2018) who identified that an increase in the household’s income from other sources is likely to decrease the proportion of milk that the household sells through interlocked contractual arrangements by 0.01%, other variables in the model held constant.

**Market Linkage**

The estimated coefficients for market linkage are positive and statistically significant; suggesting that at a 5% significance level, the dairy farmerswho have market linkage have a higher probability of participating in milk market than those who do not have market linkage. The odds rationOR=2.234 indicates that keeping other factors constant, dairy farmers who have market linkage about 2.234times more likely to be to participate in milk market than their counterparts. The reason might be because they can easily get the potential buyers and increase their motivation to participate in the marketif they have market linkage. This result supportedby Gemecho O. et al. (2020)who found that as farmers have access market linkage , the probability of participation in marketing 1.75 times.

# CHAPTER FIVE

# CONCLUSION AND RECOMMENDATIONS

## Conclusion

The study found out that from the total small dairy farmers, 55.75 % of them participated in milk market and the remaining 44.21% of them didnt not participated in milk market. This indicated that the majority of the sampled small dairy farmers for this study have participated in milk market. Since the response variable is binary meaning zero or one, with one being participated in milk market and zero otherwise this study employed binary logistic regresion model.

The model fit results indicated that education of household head, household size, number of breed cows, number of local cows, the volume of milk production, access to marketing information, access to dairy extension services, non-dairy farm income and market linkage were found to be a statistically significant predictor of milk market participation of small dairy farmer in Sululta town at 5% level of significance. And rest predictor variablessuch as sex of household head, age of household head, marital status of household head and experience in dairy farmingwas not significantly predicting milk market participation of small dairy farmers in Sululta town at 5% level of significance.

The result of the logistic regression model further revealed that an increase in the education status of household heads, number of breed cows, number of local cows, volume of milk production increased the dairy farmers' odds of participating in the milk market. Likewise the access to marketing information, access to dairy extension services, and market linkage also significantly increase the odds of milk market participation of the dairy farmer. On the contrary, an increases in the household size and an increase in non-dairy farm income significantly decrease the odds of milk market participation of the dairy farmer.

From this we can concluded that demographic factors such as education of household head, and household size playes a significance role for the on dairy farm households to partcipate in milk market. In adition to this economic factors such as number of breed cows, number of local cows and the volume of milk production and non-dairy farm income and institutional factors such as access to marketing information, access to dairy extension services, and market linkage have a significant effect on the participation of the dairy farmers in milk market

## 5.2 Recommendations

Based on the analysis made, results obtained and conclusions drawn in the study, the following recommendations are forwarded to the policymakers, firms, concerned government actors andother stakeholders.

1. The government, concerned institutions, and other involved stakeholders should consider the major factors that idetified as the determinants of milk market participation of small dairy farmers in this study while designing a policy that will impact milk market participation of small dairy farmers.
2. This study identified that the education of the household heads of dairy farmers increases their milk market participation so the government and cornered body should support the dairy farmer to participate in formal education to enhance their market participation.
3. It is also recommended that helping the dairy farmer in terms of ownership of cross-breeding milking cows as well as increasing the ownership of local milk cows will increase their volume of milk production which directly increases their milk market participation.
4. It is recommended that the intervention of government and nongovernmental organizationin facilitating the accessibility of institutional factors such as marketing information, access to extension services and marketing linkageshould be necessary to increase the participation of the dairy farmer in the milk market.

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# ANNEX

**Annex 1: Results of descriptive statistics of DFBETAs, diagnostic tests for outliers and influential value for standard logisticregression**

Table 4. 6 Descriptive Statistics of DFBETAs

|  |  |  |  |
| --- | --- | --- | --- |
|  | N | Minimum | Maximum |
| DFBETA for constant | 95 | -.19535 | .21311 |
| DFBETA for Sex\_HH\_HeadDFBETA for Age\_HH\_Head | 9595 | -.08321-.09123 | .06894.5142 |
| DFBETA for Maritial\_Status\_HH\_Head | 95 | -.17581 | .12076 |
| DFBETA for Education\_HH\_Head | 95 | -.00708 | .01680 |
| DFBETA for Experience | 95 | -.04260 | .05477 |
| DFBETA for Household\_Size | 95 | -.19535 | .21311 |
| DFBETA for Number\_breedcowDFBETA for Number\_locacow | 9595 | -.08321-.09123 | .06894.15142 |
| DFBETA for Milk\_productionDFBETA for Acces\_Market | 9595 | -.05321-.05123 | .16894.25142 |
| DFBETA for Dairy\_ExtensionDFBETA for Non\_Dairy \_IncomeDFBETA for Market\_LinkageValid N (listwise) | 95959595 | -.07321-.09123-0.9321 | .16894.15142.24613 |



Figure 4. 2 Plots of Standard Residual by Predicted Probability



Figure 4. 3Plots of Deviance Residual by Predicted Probability



Figure 4. 4 Plots of Leverage Value by Predicted Probability



Figure 4. 5Plots of Cook’s Influence by Predicted Probability

**Annex 2:Questioner**

**ST. MARY’S UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

Dear Respondent,

This questionnaire was designed to collect information from Small dairy farmer in Sululta and aimed to analyze"The Determents of Milk Market Participation of small dairy farmers in Sululta Town"as a research subject for the partial fulfillmentof the requirements of Master of Art inDevelopment Management. Your response wouldhave been used only for academic purpose and kept confidential*.*

Thank you in advance for your co-operation.

Name:Tacher Haile

MA in Development Management Students

 Tell +521910832329

St.Mary's University

Addis Ababa, Ethiopia

**General Directions:**

1. You are kindly requested to give genuine responses.
2. You don ‘t need to write your identification
3. Please put a tick (√) in the appropriate box.

Put the numbers you agree with to those questions which are not multiple choices.

**Part One: Demographic Information household head**

1. Sex of household head Female [ ]  Male [ ]
2. Age of household head 15 - 24 [ ]  25-34[ ]  35- 44 [ ]  45- 54 [ ]  55- 64[ ] >=65 years [ ]
3. Marital Status household head Single [ ]  Married [ ]  Divorced/Widowed [ ]
4. Educational Level household head

Illiterate [ ]  Grade 1-8 [ ]  Grade 9-12 [ ]  Certificate [ ]

Diploma [ ]  Degree [ ]  Masters and above [ ]

6. Household Size \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part two: Information related to milk production**

7. Experience in dairy farming in years \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Number of Cross breed cow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. Number of Local breed cow \_\_\_\_\_\_\_\_\_\_\_\_\_

10. Total milk production in liters per day\_\_\_\_\_\_\_\_\_\_

11. How much of the produced milk you use for household consumption per day inliters? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. How much of the produced milk you sold per day inliters? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Part three: Exposure to Extension Services;

13. Do you have access to dairy extension services?

 Yes [ ]  No [ ]

14. If your answer to the above question is `Yes `, which main aspects of dairying were you advised by dairy extension agent?
Animal health service [ ]  use of technology [ ]  Animal Feeding [ ]  all three of them[ ]

15. Do you participate in other type of works out of milk production?

 Yes [ ]  No [ ]

16. If "yes " in your response to above question on what type of job you are engaged?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. Average Income from non- dairy farm activities\_\_\_\_\_\_\_\_\_\_\_

Part Four: Access to marketing information

18. Do you have Access to Market Information?

 Yes [ ]  No [ ]

If the answer is yes how do you get this information? Through,
1) Mass media [ ]
2) milk-association [ ]
3) neighbor who come from market [ ]
4) Others, [ ] specify \_\_\_\_\_\_\_\_\_\_\_

Part Five: Market Linkage

19. Does your business have a market linkage?

 Yes[ ] No[ ]

19. If your answer to the above question is **`` Yes ``** how does it describe your market linkages in your business?

 1. Having a market linkage for our business has helped us to improve my business.

 2. The presence of market linkages for our business has not had a positive impact on our business

20 If your answer to the above question number `**`13``**is `**` No ``**, does the lack of market linkages have a negative impact on the growth of your business?

 1. Yes [ ]  2. It has not effect [ ]

**Part six: Access to Loan Services**

21. Have you got a loan?

 Yes [ ]  No [ ]

22. If your answer to the above question is **`Yes `,** how would you describe the contribution of getting a loan to your business?

 Getting Loan has greatly contributed to the growth of our business [ ]

 Getting a loan does not contribute to the growth of our business [ ]

23. If your answer to the question number **`` 21``** is `**` No ``,** what is the reason?

 1. Because loan requirements are beyond our control[ ]

 2. Because we could not meet the requirements for a loan[ ]

 3. Because the interest rate on loans is high [ ]

 4. There are no credit service providers near to our business[ ]

24. What problems do you face when looking for a loan?

 1. Lack of Collateral.[ ]

 2. Lack of credit service providers. [ ]

 3. Lack of information about credit services. [ ]

 4. Other Reasons[ ]

25. How far is the nearest market for milk marketing in \_\_\_\_\_\_Kms or time it takes to
reach on foot in\_\_\_\_\_\_\_Hrs.

Part Seven: Participation in Milk Marketing

26. Do you participate in milk marketing?

 Yes [ ]  No [ ]

27.What other problems did you encountered during your engagement in milkmarketing?

1) Price related **[ ]**

 2) Buyer related **[ ]**

 3) Transport related **[ ]**

4) Infrastructure related **[ ]**

28. Your participation in milk market increased sales volume of milk.

Yes [ ]  No [ ]

Thank You!

**Annex 3: The Row Data of the Study**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **sn** | **Sex of HH head** | **Age of HH head** | **Marital Status of HH head** | **Education of HH head** | **Experience in Dairy Farming** | **Household Size** | **Number of Milk cow** | **Number of breed cow** | **Number of local cow** | **Milk production** | **Milk Sold** | **Access to Market** |  **Access to Dairy Extension** | **Non\_Dairy \_Income** | **Market Linkage** | **Market Participation** |
| 1 | Male | 18-30 | Married | Certificate | 1-5 Years | 5 | 4 | 1 | 3 | 6 | 2 | No | No | No | Yes | Yes |
| 2 | Male | 41-50 | Married | Grade 1-8 | 11-15 Years | 5 | 5 | 3 | 2 | 8 | 2 | Yes | Yes | Yes | Yes | No |
| 3 | Male | 31-40 | Unmarried | Grade 9-12 | 1-5 Years | 3 | 5 | 2 | 3 | 8 | 2 | Yes | Yes | No | Yes | No |
| 4 | Male | 31-40 | Married | Illiterate | 1-5 Years | 4 | 5 | 3 | 2 | 8 | 2 | No | No | Yes | Yes | Yes |
| 5 | Female | 18-30 | Married | Grade 9-12 | 1-5 Years | 5 | 5 | 4 | 1 | 8 | 2 | No | No | Yes | Yes | Yes |
| 6 | Male | 41-50 | Married | Certificate | > 15 Years | 2 | 5 | 3 | 2 | 8 | 2 | Yes | No | Yes | No | No |
| 7 | Female | 18-30 | Married | Grade 9-12 | 1-5 Years | 7 | 5 | 3 | 2 | 8 | 2 | No | No | Yes | No | Yes |
| 8 | Male | 31-40 | Married | Grade 9-12 | 11-15 Years | 6 | 5 | 1 | 4 | 8 | 2 | Yes | Yes | Yes | Yes | No |
| 9 | Male | 18-30 | Married | Grade 9-12 | 1-5 Years | 4 | 7 | 1 | 6 | 11 | 3 | No | No | No | No | Yes |
| 10 | Male | 18-30 | Married | Grade 9-12 | 1-5 Years | 4 | 6 | 1 | 5 | 9 | 3 | No | No | Yes | No | Yes |
| 11 | Male | 18-30 | Married | Grade 9-12 | 1-5 Years | 3 | 5 | 1 | 4 | 8 | 2 | Yes | Yes | No | No | No |
| 12 | Male | 31-40 | Married | Grade 1-8 | 6-10 Years | 3 | 4 | 1 | 3 | 6 | 2 | No | No | Yes | No | Yes |
| 13 | Male | 18-30 | Married | Grade 9-12 | 1-5 Years | 5 | 3 | 1 | 2 | 5 | 1 | Yes | No | No | Yes | No |
| 14 | Female | 18-30 | Married | Grade 1-8 | 1-5 Years | 5 | 3 | 2 | 1 | 5 | 1 | No | No | No | No | Yes |
| 15 | Male | 31-40 | Married | Grade 9-12 | 6-10 Years | 5 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | No | Yes | No |
| 16 | Male | 18-30 | Married | Grade 1-8 | 1-5 Years | 6 | 5 | 3 | 2 | 8 | 2 | No | No | No | No | Yes |
| 17 | Male | 31-40 | Married | Grade 9-12 | 6-10 Years | 3 | 4 | 2 | 2 | 6 | 2 | Yes | No | No | Yes | No |
| 18 | Male | 41-50 | Married | Grade 9-12 | 6-10 Years | 5 | 6 | 3 | 3 | 9 | 3 | No | Yes | No | Yes | Yes |
| 19 | Male | 31-40 | Married | Grade 1-8 | 6-10 Years | 3 | 6 | 4 | 2 | 9 | 3 | No | No | Yes | Yes | Yes |
| 20 | Male | 18-30 | Married | Grade 1-8 | 6-10 Years | 4 | 5 | 2 | 3 | 8 | 2 | Yes | Yes | Yes | Yes | No |
| 21 | Male | 18-30 | Unmarried | Grade 1-8 | 1-5 Years | 4 | 6 | 3 | 3 | 9 | 3 | No | Yes | Yes | No | Yes |
| 22 | Male | above 50 | Married | Grade 9-12 | 1-5 Years | 6 | 6 | 1 | 5 | 9 | 3 | No | No | Yes | Yes | Yes |
| 23 | Male | 18-30 | Unmarried | Grade 1-8 | 1-5 Years | 5 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | Yes | Yes | No |
| 24 | Male | 18-30 | Married | Grade 1-8 | 1-5 Years | 3 | 6 | 1 | 5 | 9 | 3 | No | No | Yes | No | Yes |
| 25 | Female | 18-30 | Married | Grade 1-8 | 6-10 Years | 5 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | No | No | No |
| 26 | Male | 18-30 | Married | Grade 9-12 | 1-5 Years | 7 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | Yes | No | Yes |
| 27 | Male | 18-30 | Unmarried | Grade 1-8 | 1-5 Years | 6 | 4 | 1 | 3 | 6 | 2 | No | No | No | No | Yes |
| 28 | Female | 18-30 | Married | Grade 1-8 | 1-5 Years | 5 | 5 | 2 | 3 | 8 | 2 | No | No | No | No | No |
| 29 | Male | 41-50 | Married | Grade 1-8 | > 15 Years | 5 | 4 | 1 | 3 | 6 | 2 | Yes | Yes | Yes | Yes | Yes |
| 30 | Male | 18-30 | Married | Illiterate | 1-5 Years | 4 | 6 | 3 | 3 | 9 | 3 | Yes | Yes | Yes | No | No |
| 31 | Male | 31-40 | Unmarried | Grade 1-8 | 1-5 Years | 8 | 4 | 2 | 2 | 6 | 2 | Yes | No | No | Yes | No |
| 32 | Female | 18-30 | Married | Grade 1-8 | 1-5 Years | 9 | 6 | 3 | 3 | 9 | 3 | Yes | No | No | No | No |
| 33 | Male | above 50 | Married | Grade 1-8 | > 15 Years | 5 | 6 | 4 | 2 | 9 | 3 | Yes | No | Yes | No | Yes |
| 34 | Female | 18-30 | Married | Grade 9-12 | 1-5 Years | 5 | 4 | 3 | 1 | 6 | 2 | Yes | Yes | Yes | No | No |
| 35 | Male | 31-40 | Unmarried | Grade 1-8 | > 15 Years | 3 | 5 | 3 | 2 | 8 | 2 | No | No | No | No | No |
| 36 | Male | 31-40 | Married | Grade 9-12 | 11-15 Years | 4 | 3 | 1 | 2 | 5 | 1 | Yes | Yes | Yes | Yes | Yes |
| 37 | Male | 31-40 | Divorced | Illiterate | 11-15 Years | 2 | 5 | 1 | 4 | 8 | 2 | Yes | No | Yes | No | Yes |
| 38 | Male | 31-40 | Married | Grade 1-8 | 6-10 Years | 4 | 7 | 1 | 6 | 11 | 3 | Yes | No | Yes | No | Yes |
| 39 | Male | 18-30 | Unmarried | Grade 1-8 | 1-5 Years | 5 | 6 | 1 | 5 | 9 | 3 | Yes | No | Yes | No | No |
| 40 | Female | 18-30 | Married | Grade 9-12 | 1-5 Years | 4 | 5 | 1 | 4 | 8 | 2 | Yes | No | Yes | Yes | Yes |
| 41 | Female | 18-30 | Married | Grade 9-12 | 6-10 Years | 5 | 4 | 1 | 3 | 6 | 2 | Yes | No | Yes | No | Yes |
| 42 | Male | 18-30 | Divorced | Illiterate | 6-10 Years | 4 | 4 | 2 | 2 | 6 | 2 | Yes | No | Yes | No | No |
| 43 | Male | 31-40 | Divorced | Illiterate | 6-10 Years | 8 | 4 | 2 | 2 | 3 | 1 | Yes | No | Yes | No | Yes |
| 44 | Male | 31-40 | Unmarried | Illiterate | 6-10 Years | 2 | 8 | 3 | 5 | 12 | 4 | Yes | Yes | Yes | No | Yes |
| 45 | Male | 31-40 | Married | Illiterate | 6-10 Years | 2 | 4 | 2 | 2 | 6 | 2 | Yes | Yes | Yes | Yes | No |
| 46 | Female | 18-30 | Married | Illiterate | 1-5 Years | 3 | 5 | 3 | 2 | 8 | 2 | No | No | No | No | Yes |
| 47 | Male | 31-40 | Married | Grade 1-8 | 6-10 Years | 5 | 7 | 4 | 3 | 11 | 3 | No | No | No | No | No |
| 48 | Male | 41-50 | Divorced | Grade 9-12 | > 15 Years | 5 | 4 | 2 | 2 | 6 | 2 | No | No | No | No | Yes |
| 49 | Male | 18-30 | Married | Illiterate | 1-5 Years | 9 | 6 | 3 | 3 | 9 | 3 | No | No | No | No | Yes |
| 50 | Male | 31-40 | Married | Illiterate | 6-10 Years | 8 | 4 | 1 | 3 | 6 | 2 | Yes | Yes | Yes | Yes | Yes |
| 51 | Male | 31-40 | Married | Grade 1-8 | 11-15 Years | 5 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | Yes | Yes | No |
| 52 | Male | 41-50 | Married | Grade 1-8 | > 15 Years | 4 | 6 | 1 | 5 | 9 | 3 | Yes | No | Yes | Yes | Yes |
| 53 | Male | 18-30 | Married | Grade 1-8 | 1-5 Years | 3 | 6 | 1 | 5 | 9 | 3 | Yes | No | Yes | Yes | Yes |
| 54 | Male | 18-30 | Married | Illiterate | 1-5 Years | 4 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | Yes | Yes | No |
| 55 | Male | 18-30 | Married | Grade 1-8 | 1-5 Years | 3 | 6 | 1 | 5 | 9 | 3 | Yes | No | Yes | Yes | Yes |
| 56 | Male | 41-50 | Married | Illiterate | > 15 Years | 3 | 5 | 2 | 3 | 8 | 2 | No | No | No | No | No |
| 57 | Female | 31-40 | Married | Grade 1-8 | 6-10 Years | 5 | 4 | 1 | 3 | 6 | 2 | No | No | No | No | Yes |
| 58 | Male | 18-30 | Married | Grade 1-8 | 6-10 Years | 3 | 6 | 3 | 3 | 9 | 3 | Yes | No | Yes | Yes | Yes |
| 59 | Female | 31-40 | Married | Grade 1-8 | 11-15 Years | 5 | 5 | 2 | 3 | 8 | 2 | Yes | Yes | Yes | Yes | No |
| 60 | Female | 18-30 | Married | Grade 9-12 | 1-5 Years | 3 | 5 | 3 | 2 | 8 | 2 | No | No | No | No | Yes |
| 61 | Male | 18-30 | Married | Grade 1-8 | 1-5 Years | 3 | 7 | 4 | 3 | 11 | 3 | Yes | Yes | Yes | Yes | No |
| 62 | Female | 18-30 | Unmarried | Grade 1-8 | 1-5 Years | 3 | 5 | 3 | 2 | 8 | 2 | Yes | Yes | Yes | Yes | No |
| 63 | Male | 18-30 | Married | Grade 1-8 | 6-10 Years | 3 | 4 | 3 | 1 | 6 | 2 | Yes | No | Yes | Yes | Yes |
| 64 | Male | 31-40 | Unmarried | Illiterate | 6-10 Years | 3 | 3 | 1 | 2 | 5 | 1 | Yes | Yes | Yes | Yes | Yes |
| 65 | Male | 41-50 | Married | Illiterate | > 15 Years | 5 | 3 | 1 | 2 | 5 | 1 | No | No | No | No | Yes |
| 66 | Male | 18-30 | Married | Grade 1-8 | 6-10 Years | 6 | 5 | 1 | 4 | 8 | 2 | No | No | No | No | No |
| 67 | Female | 18-30 | Married | Certificate | 6-10 Years | 3 | 7 | 1 | 6 | 11 | 3 | Yes | Yes | Yes | Yes | Yes |
| 68 | Female | 18-30 | Unmarried | Illiterate | 6-10 Years | 5 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | Yes | Yes | No |
| 69 | Male | 18-30 | Unmarried | Illiterate | 1-5 Years | 3 | 5 | 1 | 4 | 8 | 2 | Yes | Yes | Yes | Yes | No |
| 70 | Female | 31-40 | Married | Grade 1-8 | 11-15 Years | 4 | 5 | 2 | 3 | 8 | 2 | Yes | No | Yes | Yes | Yes |
| 71 | Male | above 50 | Unmarried | Grade 1-8 | > 15 Years | 3 | 3 | 1 | 2 | 5 | 1 | No | No | No | No | Yes |
| 72 | Male | 31-40 | Married | Certificate | 6-10 Years | 5 | 4 | 3 | 1 | 6 | 2 | Yes | Yes | Yes | Yes | No |
| 73 | Male | above 50 | Married | Grade 1-8 | > 15 Years | 6 | 7 | 2 | 5 | 11 | 3 | No | No | No | No | Yes |
| 74 | Male | 18-30 | Married | Illiterate | 6-10 Years | 3 | 5 | 3 | 2 | 8 | 2 | No | No | No | No | Yes |
| 75 | Female | 41-50 | Divorced | Grade 1-8 | > 15 Years | 3 | 6 | 4 | 2 | 9 | 3 | No | No | No | No | Yes |
| 76 | Male | 41-50 | Married | Illiterate | 11-15 Years | 7 | 5 | 2 | 3 | 8 | 2 | No | Yes | Yes | Yes | No |
| 77 | Male | 31-40 | Married | Grade 1-8 | 6-10 Years | 5 | 5 | 3 | 2 | 8 | 2 | Yes | No | No | No | Yes |
| 78 | Male | 18-30 | Married | Illiterate | 1-5 Years | 3 | 4 | 1 | 3 | 6 | 2 | No | Yes | Yes | Yes | No |
| 79 | Male | 31-40 | Married | Illiterate | 11-15 Years | 5 | 4 | 1 | 3 | 6 | 2 | No | No | No | No | Yes |
| 80 | Male | 31-40 | Married | Illiterate | 6-10 Years | 3 | 6 | 1 | 5 | 9 | 3 | No | No | No | No | Yes |
| 81 | Male | above 50 | Married | Grade 9-12 | > 15 Years | 8 | 6 | 1 | 5 | 9 | 3 | Yes | Yes | Yes | Yes | No |
| 82 | Male | 31-40 | Married | Illiterate | 1-5 Years | 3 | 6 | 1 | 5 | 9 | 3 | No | Yes | Yes | Yes | No |
| 83 | Male | 18-30 | Unmarried | Grade 9-12 | 1-5 Years | 3 | 6 | 1 | 5 | 9 | 3 | Yes | No | No | No | Yes |
| 84 | Male | 18-30 | Married | Grade 9-12 | 1-5 Years | 7 | 7 | 2 | 5 | 11 | 3 | No | Yes | Yes | Yes | No |
| 85 | Male | 18-30 | Married | Grade 1-8 | 1-5 Years | 3 | 4 | 1 | 3 | 6 | 2 | No | Yes | Yes | Yes | No |
| 86 | Male | 41-50 | Divorced | Grade 1-8 | > 15 Years | 5 | 6 | 3 | 3 | 9 | 3 | No | No | Yes | Yes | Yes |
| 87 | Male | 41-50 | Married | Illiterate | 11-15 Years | 3 | 5 | 2 | 3 | 8 | 2 | Yes | Yes | Yes | Yes | No |
| 88 | Male | 31-40 | Married | Grade 1-8 | 6-10 Years | 9 | 6 | 3 | 3 | 9 | 3 | Yes | No | Yes | Yes | Yes |
| 89 | Female | 18-30 | Unmarried | Certificate | 1-5 Years | 3 | 7 | 4 | 3 | 11 | 3 | No | No | No | No | Yes |
| 90 | Male | 31-40 | Married | Illiterate | 11-15 Years | 3 | 9 | 3 | 6 | 14 | 4 | No | Yes | Yes | Yes | No |
| 91 | Male | 31-40 | Married | Certificate | 6-10 Years | 3 | 5 | 3 | 2 | 8 | 2 | No | No | No | No | No |
| 92 | Male | above 50 | Married | Illiterate | > 15 Years | 5 | 5 | 1 | 4 | 8 | 2 | No | Yes | Yes | Yes | Yes |
| 93 | Male | 31-40 | Married | Certificate | 1-5 Years | 5 | 5 | 1 | 4 | 8 | 2 | Yes | No | No | No | No |
| 94 | Female | 18-30 | Married | Illiterate | 1-5 Years | 6 | 5 | 1 | 4 | 8 | 2 | No | No | No | No | Yes |
| 95 | Male | 18-30 | Married | Illiterate | 1-5 Years | 2 | 5 | 1 | 4 | 8 | 2 | No | Yes | Yes | Yes | No |