

LINKING RURAL SMALLHOLDER MILK PRODUCERS TO URBAN MARKETS

A case study of selected wards in Kibaha District, Tanzania



A research report submitted to Van Hall Larenstein University of Applied Sciences in partial fulfilment for the requirement of Master in Agriculture Production Chain Management specializing in Livestock Chains

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DEDICATION

This work is dedicated to my lovely daughter Diana Mutasa, my late father Samson Kailembo and my late beloved husband Dr. Joseph Mutasa.

ABSTRACT

The research was conducted to identify marketing channels which offer a remunerative price for the smallholder milk producer in rural areas of Kibaha district in Tanzania. The study investigated the current marketing channels, marketing constraints facing smallholders including factors such as price quality of milk, their bargaining power and source of information and the functions of different actors, supporters and influencers in the milk chain.

Forty small holder milk producers were randomly selected from four wards of Kibaha district. Data was gathered using a structured questionnaire that focused on milk production milk quality requirements, source of information, determinants of price and constraints in milk marketing. Other stakeholders interviewed were interviewed including two milk traders and middlemen, one retailer and three government officers, (two extension workers) and district veterinary officer).The chain map was used to analyse the marketing channels

The study revealed that there were four marketing channels that smallholder farmers used as their milk outlets. The function of the main actors were producing, trading, retailing and consuming. Fifty percent of the producers sold their milk through the middlemen and few 2.5% were through vendor, the main reason was that they were the only customers available. The results of the study indicate that 60% of the producers were producing between 17 -27 litres of milk per day and selling 5-10 litres per day. Testing for milk quality was done at each stage of the milk marketing channel; indicators of milk quality were namely hygiene, water content and odour which were mentioned by 57.5% of the milk producers.

However 45% of the producers had their milk price determined by middlemen. Majority of the producers 80% were not satisfied with the price of milk that was being offered by the buyers. It was noted that 75% of the producers were living more than 52 Kilometres from Kibaha urban the main milk market place, this had affected the milk price, the greater the distance the lower the milk price. Seventy five percent of smallholder dairy farmers got information about milk markets from traders and farmers; the information obtained were mainly on price and quality of milk. Majority 95% of the wards had no milk cooling facilities and milk collection centre which contributed to insufficient milk collection.

Rural smallholder milk producers are located far from the major urban milk markets, thus their main milk outlet is through the informal channels. It was noted that several factors constrain the milk market environment which includes poor road infrastructure and thus increased transport cost, long distance between producers and the milk markets, lack of collective marketing and insufficient coordination among the chain actors. Therefore, forming farmers organisations, and similar forms of collective action are an avenue to reduce high transaction costs, increase bargaining power and obtain the necessary information. Improving the road infrastructure and introducing innovation to the existing marketing channels can open up new marketing opportunities for rural smallholder milk producers. Building farmer's capacity through training and improving coordination among chain actors will improve the milk business environment.

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LIST OF ABBREVIATIONS

FFS	Farmers Field Schools
TSZ	Tanzania Short Horn Zebu
MLFD	Ministry of Livestock and Fisheries Development
WHO	World Health Organization
GDP	Gross Domestic Product
FAO	Food and Agriculture Organization
Tsh	Tanzanian shilling
Ksh	Kenyan shilling
TBS	The Tanzania Bureau of Standards

DEFINITION OF TERMS

Trader: A trader is person who buys milk from the middlemen and sells to the retailer or end consumer.

Middlemen: A middlemen is an intermediary between the producer of milk and the milk trader.

Retailers: The one who buys either directly from farmers, from traders or wholesale markets, and sell the products to consumers through retail outlets (Tracey, 2005).

Formal channel: This is a channel where by Laws and regulations regarding sale of milk are as stated by the Dairy industry Act of Tanzania 2004.

Informal channel: This is a channel where by laws and regulations stated in the Dairy industry Act of Tanzania 2004 are not followed.

Market linkages: This refers to the connection between the producer and the ultimate consumer (Tracey 2005).

CHAPTER 1: INTRODUCTION

1.1 Background information

The Tanzania dairy sub sector is still developing and relies on smallholder farmers for the milk supply. The main dairy animal in Tanzania is cattle which is classified as dairy for those that average lactation is about 2000 litres and dual purpose cattle producing about 300-500 litres, (Njombe, *et al* 2011). Approximately 70% of the milk production comes from smallholder farmers. The main cattle breeds in use are the crosses of exotic breeds to the TSZ and the indigenous breed TSZ. In 2012 the milk production was 1.92 billion litres, (Budget speech, 2013). Ninety percent of the raw milk is consumed at a point of production and 10% is marketed, (NIRAS, 2010). The informal and formal marketing channels are the main marketing systems that are used, (Njombe *et al* 2011)

“Through the national strategy for growth and reduction of poverty, Tanzania aims to reduce poverty by transforming the agriculture based economy into a market led, competitive, and semi industrial economy where smallholder farmers dominate the sector”, (Kawa *et al*, 2007).

Figure 1: Map of Tanzania



Source: Heifer international 2010

The growth of the dairy sector has great potential to contribute to poverty alleviation in rural areas. The dairy sector is a key source of income for smallholder dairy farmers and also plays a major role in nutrition an important source of protein for the farmer’s households. (Njombe *et al*, 2012). This important role of dairy is also seen in other contexts where for example in west region of Cameroon, 95% of the pastoralist women depend exclusively on milk production for their income, (Kacho, 2010).

The dairy production system in Tanzania relies mainly on extensive rearing of traditional cattle characterized by low milk productivity. The indigenous breeds are mainly kept for beef and milk production. The average milk production for indigenous breed is 1.5-3 litres per cow/day and the average herd is 10-50 cows.

Another system is the intensive small dairying where farmers keep a small number of crossbred cattle. The average herd consist of 3-9 crossbred cows The average milk production per cow/day is 6-10 litres (Changa *et al*, 2010).

Smallholder dairy development programs were introduced in rural areas of Tanzania in 1980s as a means of rural poverty alleviation. The programme focused on cross breeding indigenous zebu cows which have low milk yield but are more resistant to disease with exotic bulls so as to get a cross breed with high milk production.

During the mid-seventies the government of Tanzania established Tanzania dairy limited (TDL), a parastatal to deal with improving dairy marketing activities. This parastatal was involved in collecting milk from rural areas, construction of milk collection centres and developing of small scale processing plants. During this time the government set milk prices and farmers were encouraged to increase milk production to meet the urban demand and smooth running of the processing plant. The farmers were assured of the purchase of all the milk produced at a stable price. Due to inefficient performance of TDL the government withdrew from direct involvement production and marketing of milk and milk products. All the processing plants which were under the TDL were privatized. The liberalization of the sector was not accompanied by regulatory reform, and this created an opportunity for the informal market to emerge.

The decline of the (TDL) left the smallholder dairy farmers without a reliable market for their milk (Swai, 2011). Milk being a perishable product has to be moved to the market daily. According Schalkwyk *et al* (2012), smallholder farmers market their produce through channels offering marginal prices because they either lack knowledge or have difficulties in accessing markets that are more rewarding.

1.2. Scope of the study

The research was carried out in four wards of Kibaha district in Tanzania. These include Mlandizi, Magindu, Kwala and Ruvu. The target population were smallholder farmers with less than 10 cross breed cows for farmers keeping indigenous cows and less than 50 cows for those keeping indigenous cows.

1.3. Justification of the study

The rural smallholder milk producers in Kibaha district are located in remote areas with poor road network resulting in milk produced not reaching the urban markets that can offer profitable prices for farmer's milk. This means that much of the milk produced in rural areas of Kibaha cannot reach lucrative urban market. Although many studies have been conducted on the dairy sector in Tanzania (Niras, 2010; Njombe *et al* 2011), there is little study that attempted to identify milk market channels through which farmers can market their milk. This is the gap that this study intends to fill by identifying alternative milk channels through which rural smallholder farmers in kibaha district can market their milk produce in order to earn an income for poverty alleviation.

1.4. Research problem

Smallholder milk producers in rural areas of Kibaha district keep cattle with the objective of producing milk to feed the family and to sell in order to raise income. As the size of herd increased, milk production also increased leading to surplus milk exceeding local demand and sometimes leading to wastage during the rainy season when the roads are not accessible. Marketing of surplus milk outside their own area is a considerable problem to the farmers. At present the surplus milk is sold to middlemen and milk vendors who are not always available to collect the milk. The problem is increased by insufficient knowledge about current marketing outlets of smallholder farmers and lack of information about access to alternative urban markets.

Due to these challenges, there is the need to identify alternative milk channels for the surplus milk that is sufficiently remunerative to producer.

1.5 Research Objective

To identify alternative potential marketing channels that offers a remunerative price for the milk produced by smallholder farmers in rural areas of Kibaha district.

1.6 Research questions

Main research question 1

What are the present milk marketing channels for the smallholder farmers in the district?

Sub questions

- 1.1. What are the functions of different actors in milk marketing channels and their relationships?
- 1.2. Who are the supporters and influencers of the milk marketing channels and what are their roles?
- 1.3. What is the current amount of milk in litres produced in Kibaha district?
- 1.4. What are the existing measures done by the government to support smallholder milk producer to access milk markets

Main research questions 2

What are the barriers for the smallholder dairy farmers to sell milk to the potential new urban markets?

Sub questions

- 2.1. What are the milk quality requirements of the milk markets?
- 2.2. What physical infrastructures are in place for smallholder milk producer?
- 2.3. How do smallholder dairy farmers get milk market information?

CHAPTER 2: LITERATURE REVIEW

2.1 Tanzania dairy industry overview

According to (Njombe, *et al*, 2011) Tanzania has "21.3 million cattle, out of this 680,000 are dairy cattle mainly crossbreed of Friesian, Jersey, Ayrshire breeds with the Tanzania shorthorn Zebu. Total annual milk production has increased from 814 million litres in 2000/01 to 1.65 billion litres in 2009/10" the increase in milk production is due to increase in the number of cattle as shown in (Table1), and also improvement in the milk collection.

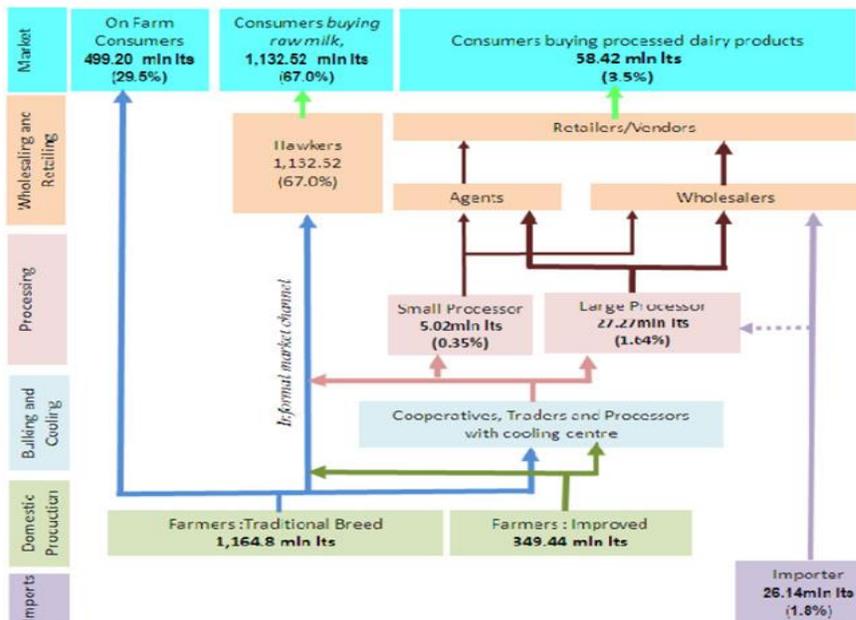
Table 1: Milk production in Tanzania

Type of cattle	Milk production ('000'Litres) year					
	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Indigenous cattle	10x10 ⁵	10x10 ⁵	10x10 ⁵	11x10 ⁵	13x10 ⁵	13x10 ⁵
Cross breeds	5x10 ⁴	6x10 ⁵	7x10 ⁵	6x10 ⁵	6x10 ⁵	6x10 ⁵
Total	15x10⁵	16x10⁵	16x10⁵	17x10⁵	19x10⁵	19x10⁵

Source: MLFD Budget speech 2012/13

According to Nira's (2010) the indigenous cattle from rural areas produce 70% of the milk production and the remaining 30% comes from crossbreeds kept by smallholder farmers. The contribution of the consumer market into home consumption is 29.5%, while those who consume milk through the informal channel of hawkers is 67%. Thus the informal milk marketing channels leads the marketing of the raw milk. On the other hand the milk that is consumed through the formal channels only 3.5% is mainly in a treated form (Figure 2).

Figure 2: An overview of the dairy industry in Tanzania



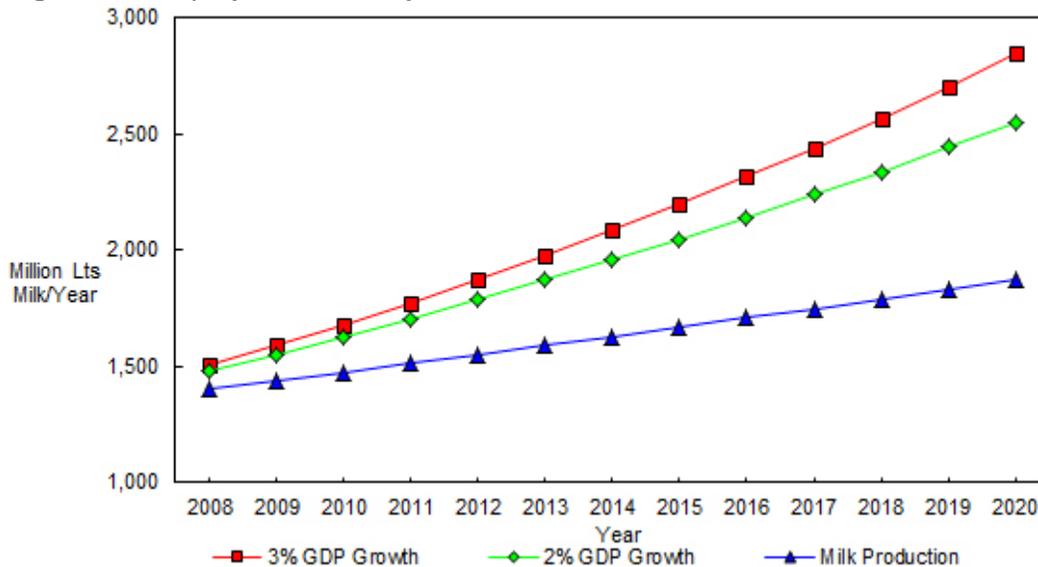
Source: NIRA'S Report 2010

Most smallholder producers sell their livestock products to low income consumers via informal markets. According to McDemott *et al* (2010) increased income and growth in urban centre are creating demand for more and different types of livestock products. This is increasing the length

and complexity of livestock value chains including new quality and safety standards requirement in these livestock markets, making it more challenging for smallholders to participate in these growing markets

In Tanzania, the data indicates that the rise in milk production from both indigenous and upgraded dairy cattle. However this rise is due to increase in herd size rather than in productivity of the cows. The cross breed have a capacity to produce 2000 litres annually and the indigenous breed can produce 300 to 500 litres per year. At present, only a slight proportion (10%) of marketable surplus of milk produced annually is filtering through, into the urban markets and processing plants. A large proportion of milk is consumed at home or wasted in the rural milk producing areas as observed by (Njombe, 2011). According to a recent study milk productions are projected to increase by 41% by the year 2020 as shown in (figure 3), CGIAR (2011), this drift present chance for smallholder dairy farmers and their market agents. The consumption of milk in Tanzania is still low, it is estimated that Tanzanians consume 39 litres of milk per year, which is below standard of WHO a person is required to consume 200 litres per year (MMA, 2008).

Figure 3: Milk projection in the year 2020



Source: CGIAR 2011

2.1.1 The role of government in the dairy industry

The role of government is provision of laws, regulation and policy. The objective of Tanzanian livestock policy is to “contribute towards national food security through increased production, processing and marketing of livestock products to meet national nutritional requirement” (MLD 2006) The policy also emphasises the need to utilize existing resource for commercialization and market oriented dairying in order to raise income of dairy producers and improve their standard of living. According to MLD (2006) the dairy policy highlights the importance of value addition to the livestock products in order to increase shelf life and get access to competitive markets. Various Acts have been formulated such as the dairy Act of Tanzania 2004 and the meat Act of 2006, in order to improve the dairy sector in the country. TBS is a regulatory body with the directive over quality standards of raw milk and processed goods for agricultural produces, (Dillmann *et al*, 2011). The other role of the government is to improve infrastructure such road network, transport facilities, power supply and milk collection centre, (Njombe *et al*, 2011).

2.1.2 Milk Consumption

Milk consumption in Tanzania has increased from 20.4 litres per person per year in 1995 to 40 litres in 2010 (Njombe *et al*, 2011). Comparing this figure and those that have been recommended by FAO of 200 litres per year this levels are still low. Several factors contribute to the low consumption rate including cultural beliefs, low production and traditional taboos which restrict people from consuming milk. Marketing of milk is done in urban and peri urban areas where consumption is rather higher.

2.1.3 Milk imports

According to (Niras, 2010) Tanzania in 2009 imported milk from 37 countries major ones are South Africa, Kenya, The Netherlands, Switzerland Denmark and Ireland. Others are Australia, China, Egypt, France, Germany, India, Indonesia, Italy, Lebanon, Pakistan, Thailand, Uganda and United Kingdom. These imports are due to the fact that 70% of the production from the traditional sector does not filter into processing plants owing to, poor road infrastructure, limited access of electricity to milk cooling centre, domination of the informal marketing system all these contribute for the small amount of milk to penetrate the formal marketing system. The demand of processed dairy product is filled by imports. (RLDC, 2010) reports that in 1990s the local processing plants were capable of meeting about 33% of the demand. The rest of milk was imported.

2.1.4 Transportation of milk and milk collection

Smallholder farmers in rural areas face difficulties in transporting their milk to selling points. Producers, vendors and middlemen in Tanzania usually transport milk to selling points on bicycles or public transport and sometimes they have to carry it on their heads if not more than 20 litres, (Omoro *et al*, 2009) reports that 56% of the milk collectors use bicycles to deliver milk to the sale points. These are of help especially in areas where it is difficult for, the vehicles to pass. The means of transport limit the volume of milk that can be handled by the traders. Distance can hinder smallholder milk producers from reaching the market,

“Milk collection centres are usually located in areas where is surplus milk above the local demand and are connected to market in urban areas,” (Njombe, 2013).In urban areas milk demand is high as people have average income higher than the rural areas. Remoteness and poor infrastructure particularly rural roads constitute the largest bottleneck to collection and marketing of milk. Due to this lack of reliable market a significant amount is left for the calves as reported by Njombe *et al* (2011).More than 90% of the of the total marketed milk in Tanzania comes from the dairy herd,(URT, 2010).

2.2 Milk marketing system

The milk marketing system in Tanzania can be characterized as a domestic sector that includes regional trade and specialized local milk shops. Farmers in rural set up follow different channels to reach the consumer. According to the study of (Panda *et al*, 2012), smallholder farmers lack vertical linkages to the marketing channels, which result in their exclusion from the use of formal markets, the outcome is that they become locked and continue to operate facing various market constraints and they do not receive a rewarding income from their produce. The study also argued that access to market information, adding value and grading the produce, good market infrastructure and guaranteed market influence farmers to formal market participation, (Panda *et al*, 2012). According to Joshi, (2004) In marketing system three key issues are considered this are, marketing channels to understand the product flow ,market margins to understand margins and profit signals, and market price to understand market price signals.

2.2.1 Marketing channels

“Marketing Channels are sets of interdependent organizations participating in the process of making a product or service available for use or consumption (Savvaki, 2013), generally goods are not always bought directly from produce. The producer use different channels to supply their produce to consumer. A marketing channel begins with the producer or service provider offering a product or service for sale these service product or service are then offered to an intermediaries which can be agent, broker, wholesaler, or retailer.

According to Omore *et al*,(2003) milk marketing system consists of different chains and channels. They further explain that marketing channels are alternative route of product flows from producer to consumer. In the marketing system the product changes ownership as if moves from one stage to another. Milk flows from producer to consumer on the way to consumer additional cost is incurred at each stage. According to (Kohls *et al*, 2008) farmers in rural areas also follow different channels to have their produce reach consumers (Kohls *et al*, 2008).

From the study done by Kumar *et al* (2012).Marketing channels choice among farmers are influenced by both institutional and technical factors. Where institutional and technical factor are poorly developed, farmers have difficulty in marketing their produce through formal or informal market. The net price received by producer is mainly higher in the channel where they sell the produce directly to the consumer.

2.2.2 Informal channels

This is a system where by milk is marketed without an organized channel. It involve direct sell from producer to consumer this can be through farm gate or at a local market within the producing area or may pass through middle men and vendor to consumer. Informal milk marketing channels refers to channel moving raw milk to final consumers, Ngigi (2004). The informal market usually does not incur cost of processing nor packaging hence the market margins between farmer and consumer could remain smaller .In Kenya raw milk is 50% cheaper than processed milk ,(Staal *et al*, 2008).Middlemen normally have a monopolistic approach and can exploit farmers by paying unprofitable prices,(Pak, 2008)

In the study done by Kumal *et al* (2012) found that there is relationship between informal marketing choice and road infrastructure because the informal market are located near the farmer and don't have to travel a lot to market the produce.

2.2.3 Formal channels

Formal refer to a channel that processes and move the processed milk to final consumers, Ngigi (2004) These formal channel are organized in such a way that milk passes from producer to processors and then to retailers and then consumer .In this channel the processors determine the quality of milk to be produced. According (Kurwijila, 2004) there are seven milk marketing channels in Tanzania as shown in (Table, 2). The marketing of milk from most small scale and agro pastoral producer mainly follows informal. Channels. These informal channels account for more than 80% of marketed milk in East Africa and may involve multiple intermediaries, (Kurwijila *et al*, 2006).These findings confirm earlier studies conducted in other parts of the world. For instance, EADD (2008) shows that most of the milk produced in Uganda is sold through formal channels the informal channels are preferred by producer because payment is done on the spot. Indeed producers do not like the formal channel because payments take several weeks. Besides, Rajendran *et al*, (2004) argues that In India 80% of the milk is marketed through the informal channels that are highly fragmented and includes milk vendors, wholesalers, retailers and producer themselves. According to Ellen *et al*, (2008).the more the intermediaries in the chain linking producer to consumer the less the profits as each intermediary

earns lower margins, and the overall marketing efficiency of the chain is lower. Table 2 below shows various marketing channels in Tanzania.

Table 2: Milk marketing channels in Tanzania

Milk marketing channels	Number of intermediaries
Producer- consumer	0
Producer -milk vendor-consumer	1
Producer- middle men-consumer	1
Producer-processor-retailer-consumer	2
Producer- milk trader –processor- retailer- consumer	3
Producer-middle men-milk trader- retailer- consumer	4
Producer- dairy co-operative-processor-retailer-consumer	3

Source: Swai, 2011

2.3 Markets

GTZ (2007) defined market as “ the interaction of demand and supply (buyer and sellers) of a particular type of goods and services. The exchange rules differ depending on the character of the goods traded (e.g. commodities, perishable products or services)” To access markets has been one of the factors influencing the performance of smallholder producers in developing countries and specifically the least developed countries, World Bank (2007).

As individual it is difficult to access market in the cases where smallholder farmers operate individually, they have less bargaining power, insufficient information to market and their linkage to markets are weak. (Kawa 2007).,

According to Magingxa *et al* (2009), lack of access to profitable markets is a major reason why even farmers who can produce a surplus remain confined in the poverty cycle .Often farmers are forced to sell to the buyer of convenience at whatever price that the buyer dictates. Improving smallholder market access has become a key element in strategies to promote rural development and poverty reduction.

Market access proponents makes a strong and attractive case that for smallholder to thrive in the global economy, creating an entrepreneurial culture in rural communities is necessary “.Farmers produce for markets rather than trying to market what they produce. From an implementation perspective, it means shifting the focus from production related programs to more market oriented interventions”, (Barham *et al*, 2008).

Farmers’ access to market depends on the structure of the market, their location and their function in the supply chain and on the magnitude of the flow. Various institutional arrangements may be used to organize the exchange.

2.3.1 Factors affecting market access

According to Magingxa *et al* (2009), in dealing with market smallholder farmer find themselves at a disadvantage because many do not understand the market well how it works and why the price fluctuate as they have little or no information about market condition and prices. They are not collectively organized on and they have no experience of market negotiation. In the study by Heijden, et al, (2013) there are four main factors that create barriers to potential/modern market access by smallholder farmers in developing countries these are:

Insufficient volume, quality, necessary financial and human capital

Producing for market that calls for production resources that include the need of production means such as land, labour force and capital. One of the characteristic of smallholder farmers is lack of assets (low endowment in capital and land) and working capital (cash flow), these affects the way they can benefit from opportunity in agricultural markets especially in terms of the volume of product traded and quality of the product, (Bienabe, 2004).

Milk quality is one of the criteria that processor request as it has an effect on profit margins and market access, Bernadette(2008) The quality of milk deteriorates because raw milk is one of the most suitable media for the growth of a wide variety of bacteria especially immediately after milking when it is almost at a body temperature. To maintain its quality milk has to be cooled to 4^oc within 2-4 hours after milking. Timely cooling ensures that the quality of the milk remains good for processing and consumption Pandey, (2011).Milk quality deteriorates as it moves long distance without being processed. To promote marketing of milk for small-scale farmers it is necessary to develop strategies for on farming and collection of milk. Studies conducted by Swai et al (2013) he observed that informally marketed milk poses high health risk to consumers due to presence of pathogens in the milk and to environmental contamination as it is not checked for quality

Lack of bargaining power and asymmetry of negotiation

Bargaining power refers to the relative capacity of different actors to obtain favourable terms from the transaction. It is related to access to information, to producer distance and perishability of the product .Improving the bargaining power of smallholder by exploiting scale of economies and improved access to information and technology, producer cooperatives and member organization can be instrumental in overcoming some of the market imperfections and asymmetries for this to happen it needs policy and investment support from the government which favour the strengthening of producer organizations and the provision of technical and advisory services,(Staal, *at al*, 2012).

Lack of information on markets

Smallholder farmer have little information about market demand they may get information through contact with other actors in the chain but the accuracy of this information is not certified since those actors might have opportunistic behaviour. Bienabe et al (2004) describes the situation that farmers have insufficient information about price of product at final consumer's level, potential buyer and quality requirement. The weekly radio broadcasts give market information in Tanzania on the major markets, but farmer considered this information useless because the markets concerned are outside their reach and the local price in the area are rarely the same as in the larger markets. Developing relationships with chain actors could provide them with reliable and timely information, (Barham, et al, 2007).

Poor market infrastructure

Lack of access to facilities such as storage and processing facilities increase losses to commodities and reduces quality of the product. 'Poor infrastructure especially road network between production area and market is a major constraint to milk producer. It is estimated that 50 million litres are wasted every year in Rwanda, Rutamu (2008). In many countries absence or inadequacy of rural market raises transaction cost and prevent smallholder from accessing market and traders from accessing suppliers. Government could review the adequacy and availability of rural market infrastructure, particularly assembly markets and plan for improvement, (Shepherd, 2007).

Poor market infrastructure especially rural roads make it more difficult for smallholder farmers to access markets and substantially increase transaction cost. Inadequate village level market and storage facilities are restrictive in some locations, (Kawa et al 2007) Poor road network and long distance limits the willingness of the farmers to deliver milk to collection centre this gives an opportunity to vendors and middlemen as described by (Linden et al, 2009).

Kumar, et al, (2012) classified factors affecting market access and also marketing channels as institutional and technical constraints. The institutional aspects are transaction cost, market information flow, grades and standards, market organization and farmers training and education. Technical factors include physical infrastructure constraints, storage facilities, and market and road infrastructure and value addition practice to the produce. (Larsen et al, 2009), in their study concluded that cooling facilities are not always present at the place of production,

2.4 Price determination

Various markets are linked through price as a primary mechanism. According to Omore et al (2009) market efficiency can be assessed by analysing price variability among market agents and by giving attention on how prices in different places move together. Farmers who sell milk direct to consumers have higher returns as compared to those who sell through intermediaries. Studies conducted by Omore et al (2009) suggests that; as the number of intermediaries increase, the price received by farmers decrease. Stephen et al (2009) further suggest that; there is a positive correlation between price received and distance from the area of production to the market.

2.5 Chain relationship

Two types of strategies are required to for improving the condition of trading within the value chain these are stronger chain relation and stronger market institutions

2.5.1 Market chain relationship

Strong chain relationships among the chain actor create an environment where markets are valued. Farmers and traders benefit if they achieve to make their chain relationship more stable, well organised and transparent. Cost and risk are minimised when there is a strong chain relationship (KIT, IIRR 2008).

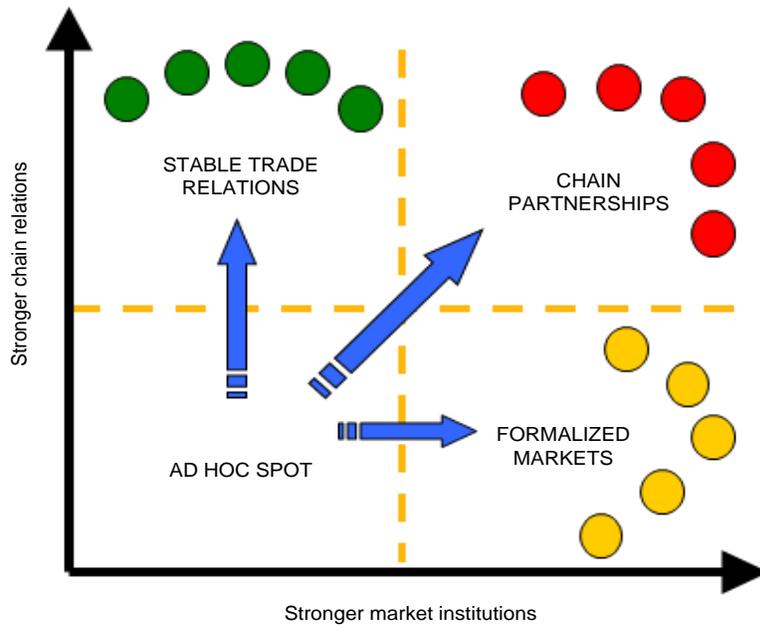
2.5.2 Market institutions

“Market institutions includes: norms, rules, regulations, policies or services that shape the way in which farmers and traders interact,” KIT and IIRR (2008). Market institutions can change depending on the marketing system they can be formal or informal. Strong market institutions enable producer and traders to do business in a beneficial way. Where there are weak institutions the markets do not function efficiently. Strong institutions would raise economic efficiency by facilitating exchange efficiency raise because trade takes place between parties that would otherwise not trade or trade differently, (Fafchamp, 2004)

2.5.3 Market interaction matrix

The different types of market relation are shown in the market interaction matrix which is combination of chain relation and market institutions These are Ad hoc spot trading, stable trade relation and formalized markets as shown in (Figure 4)

Figure 4: Chain relations



Source: Peppelenbos, KIT (2008)

Market links and a form of chain integration determine the distribution of chain income. Improving horizontal and vertical business linkages helps to establish new market contacts reduce production and transaction cost, manage quality and improve terms of contract between producer and buyer, (GTZ, 2007).

2.6 Collective action

According to (Hellin *et al*, 2008), collective action is a voluntary action taken by a group to achieve common interest. Collective action can exist in the absence of farmer organization” A report by (Markelova *et al* 2010), argues that in Africa production system and their members involved in these production face significant challenges as a result of economic environment and political context. The growth of supermarkets are providing smallholder with both new opportunity and new constraints to participate in and benefit from the market exchanges. Collective action in the form of producer groups can enable African smallholder to take advantage of the new value chains and deal with the existing market imperfections.

Farmer organization offer one way for smallholders to participate in the market more effectively. Acting collectively, put them in a better position to reduce transaction cost of inputs and output, get introduced to new technologies, education services and the necessary information , (Hellin, *et al*, 2008). Tap into high value market and allowing them to compete with large farmers, also collective action help smallholders reduce barriers to entry into market by improving their bargaining power with buyer and intermediaries, (Markelova *et al*, 2009).For the farmer group to operate successfully and sustainable there is a need of enabling environment from the government especially in policies and in capacity building that allow them to access stable and competitive market, (Markelova *et al*, 2009).

Private companies prefer to work with organized farmers rather than individuals in spite of their increased bargaining power that the group adore, (Berdegué *et al*, 2008).

Collective action is more attractive to perishable commodities such as milk, fruits and vegetables. Producer organization have a central role to play in strengthening farmers' position in traditional and in innovative markets (such as fair trade) build farmers capacity through training also defending farmers interest by negotiating with the authorities to formulate public policies that are more favourable to smallholder farmers, (Bienabe, *et al* 2004). Many buyer prefer to work with producer groups as these are better able than individual farmers to provide stable supply of quality products (Vorley *et al.*,2007)

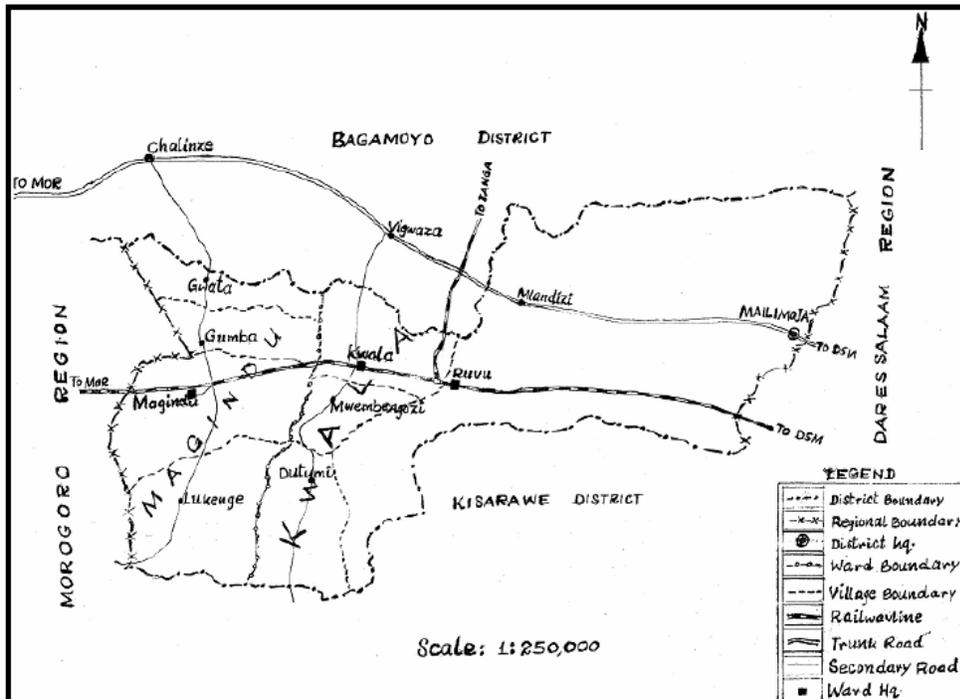
CHAPTER 3: RESEARCH METHODOLOGY

The research incorporated qualitative and quantitative methodology. It comprised of primary and secondary data sources. Primary data was obtained through questionnaire, Key informant interview and observation. The secondary data was obtained through books, archival document, journals, reports and internet search.

3.1 The study area

The study was conducted in four villages located in Kibaha district. Kibaha is one of the districts in Coast (Pwani) region (figure5). It covers a total area of about 1812 sq. kms. It has a population of 70,209 and average household size is 4.1, NBS (2013). It is located 40 km west of Dar es Salaam, along the Dar es Salaam - Morogoro Highway. The district lies between latitude 6.8° in the South and longitude 38.2° and 38.5° in the East. The District consists of 5 administrative wards: Magindu, Kwala, Soga, Mlandizi and Ruvu. The populations of livestock in the district are at Kwala and Magidu Wards, due to the highest population of pastoralists in these Wards. The district experiences hot and sunny weather through the year with maximum temperature of 30°C in December and the minimum of 25°C in July. The mean annual rainfall is 800mm. Humidity is high, however the annual maximum relative humidity is about 90% while the minimum is around 35%. The main economic activities performed by the Kibaha community are farming and livestock keeping. The district was selected because 64% of the total region dairy cattle are reared in in it (NBS, 2007). The four wards were selected due to the fact that these are among areas with limited milk market access, low income and poor crop production, hence milk production can be the best alternative.

Figure 5: Map of Kibaha district showing the study areas



Source: FAO, 2005

3.2 The conceptual framework

In linking the smallholder farmers to urban markets, there were two important dimensions that were considered in this study which are the present milk market channels and barriers in accessing the said market (See Figure 6). These dimensions were further breakdown into different aspects as discussed below.

1. Present Milk Market Channels

As stated earlier, market channels are composed of interdependent organisations or people in bringing the product or service in the market (Savvki, 2013). Analysing the functions of these actors and its relationship showed who and how the actors are involved in the different channels.

The volume and price of milk produced in the area were also considered in order to get an overview of the production and how does it affects the current situation of the market.

On the other hand, the role of the chain supporters and influencers contribute to the current market structure. Formal and informal channels are affected on the role of the supporters as well as the existing regulations, laws and policies.

2. Barriers to access new urban markets

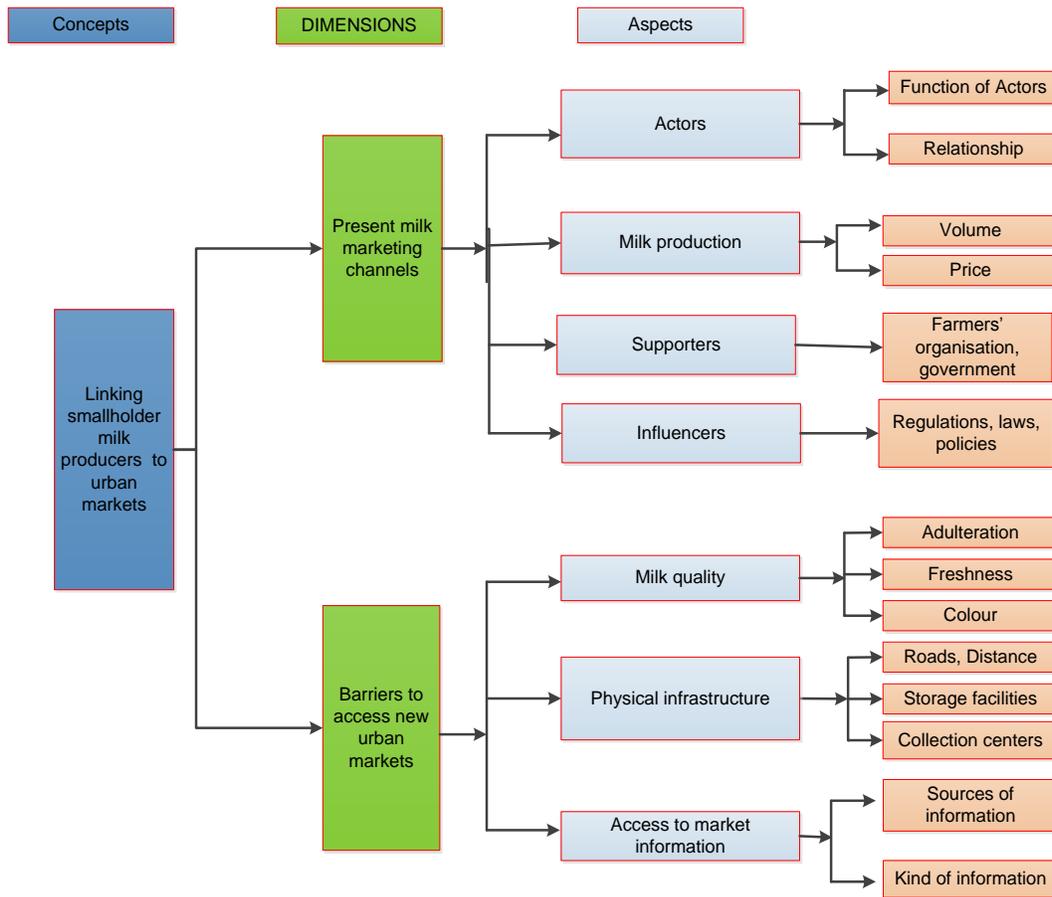
Inconsistent quality, lack of market information and poor infrastructure were some of the factors pointed out by Heidjen, et.al (2013) that creates barriers for smallholder farmers in accessing the urban market.

The issues on adulteration, freshness and milk colour were important parameters in determining the quality of milk. These have direct relations on pureness and food safety of milk in which processors are looking into (Bernadette, 2008).

Road conditions, distance to market, storage facilities, and collection centres were seen as important aspects in analysing the physical infrastructure that are not only affecting the milk quality but also incur a substantial loss thus raising transaction cost (Rutamu, 2008).

The sources of market information such as mass media, producers, and buyers were analysed as well as the kind of information namely price, quality, volume, and other that are exchanged in order to determine the amount and level of information and how it affects their access to the market.

Figure 6: Conceptual framework



3.3. Study Design

3.3.1 Survey

A survey was carried out on smallholder milk producers in rural areas of Kibaha district. Forty farmers were randomly selected from four wards which were Kwala, Magindu, Mlandizi and Ruvu. In each ward two villages were selected namely Muperambi, Kwala, Mizuguni, Lukasasi, Kitomondo and Minazi mikida respectively because they have the highest milk production as compared to other remained villages. There were two categories of farmers according to the breed type of cattle. Among those who kept indigenous breed; - twenty farmers were selected and those that kept crossbreed twenty were selected. In each village a sample of five farmers were randomly selected to ensure that each farmer had equal chance of being selected. Their names were written on a piece of paper, put in a container and five paper picked, the farmer whose name appeared was selected. A structured questionnaire was used to collect information on how farmers market their milk, choice of market channel, the number of cows they keep, milk production level, the volume of milk sold per day, information flow, demographic data and milk marketing challenges. The questionnaire was translated in Kiswahili so that those that knew how to read and write could fill it by themselves. In addition, observation was done on other

environmental aspect. Distance of the farmer from the market place was accessed to find the effect of distance on price.

3.3.2 Interview

A face to face interview was conducted by use of a prepared check list to two government officers, two milk traders, two middlemen and one retailer. From the government officers the aim was to find out their functions, policies and regulations for milk marketing and how they are helping farmers' access milk market. Also to find out the physical infrastructures that is in place to assist farmers to access market. The middle men and traders were interviewed to find out milk collection, the selling and buying price of milk and the problems they face in milk marketing.

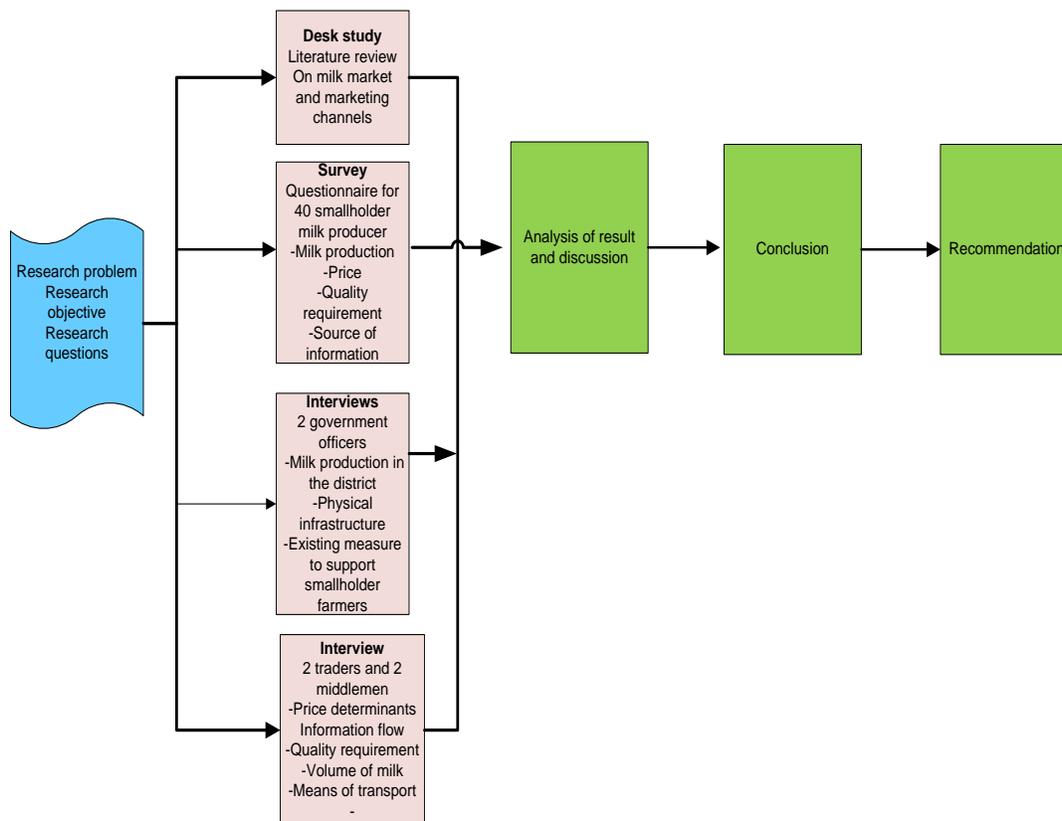
3.3.3 Desk Study

The desk study was done for collection of secondary data through, scientific journals, reports, government publication and books. It was used to get in-depth information on marketing channels, chain relation, quality of the milk and pricing mechanism.

3.4 Research frame work

The research frame work is formulated based on the research objective and research question showing the steps to be taken in order to achieve the research objective (Verschuren et al, 2010) as shown in (Figure 7).

Figure 7: Research framework



3.5 Data analysis

The quantitative data from survey was analysed using descriptive statistics coded and processed by use of statistical package for social sciences (SPSS 20). Cross tabulation was used to compare variables. Bar chart and frequency tables were also used in interpreting the results. The qualitative data obtained from the interview were analysed by the SWOT tool. The chain map was used for value chain analysis.

The table below shows the kind of information or data gathered and its sources.

Table 3: Information/data and their sources

Sub question	Information/Data	Source of information	Method used
1.1	The functions of actors in the milk marketing channels and relationships	Smallholders, milk producers, middlemen and traders	Interview , Survey
1.2	Supporters and influencers of the milk marketing channels and their roles	Extension and district veterinary Officer	Interview
1.3	Milk production in Kibaha district	District veterinary officer	Interview
1.4	Measure to improve milk markets for smallholder farmers	Government officers	Interview
2.1	Milk quality requirements of the milk market?	Smallholder Milk producers, middlemen and traders	Interview , Survey
2.2	Physical infrastructure for smallholder dairy farmers	Interview with district veterinary officer	Interview
2.3	Milk marketing information	Smallholder milk producer	Survey

3.6 Limitation of the study

During the filling of the questionnaire with smallholder farmers, some of them were hesitating to give the real data of the number cattle they owned and the milk production fearing that I am from the government authority involved in tax collection. The fear was because they normally pay tax as per head of cattle. There were no records kept.

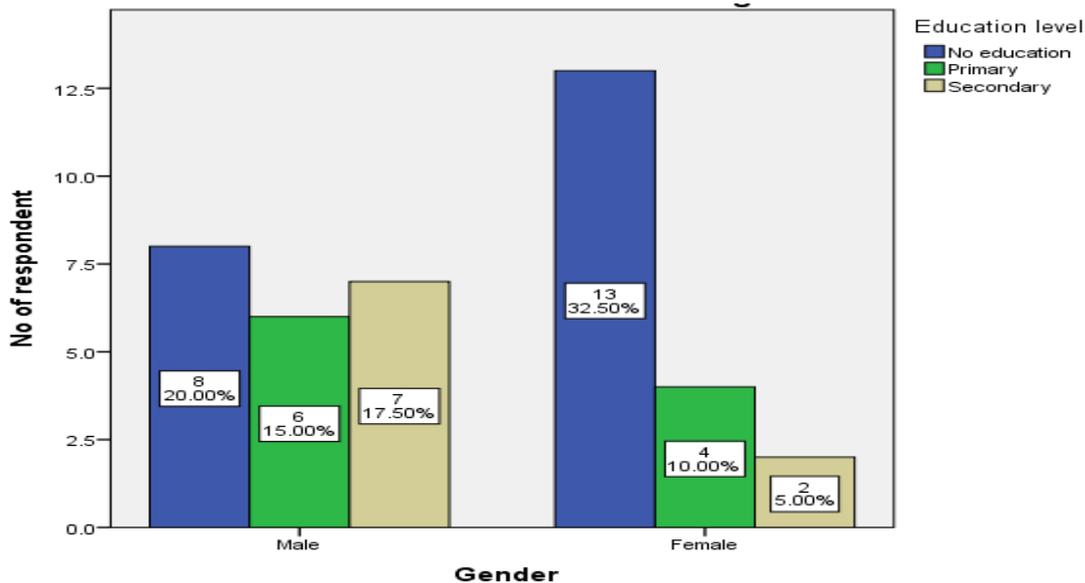
CHAPTER 4: RESULTS

This chapter explains the finding of the study that was conducted among smallholder farmers in 4 (Kwala, Magindu, Mulandizi and Ruvu) wards in Kibaha district. The district is located in the Coastal region of Tanzania. Farmers in all the wards are widely separated from one another with a distance of as far as one to two kilometres. The area is characterized by poor infrastructure making it difficult for the farmers particularly from Magindu and Kwala to access the milk market in Kibaha urban centre. Magindu was identified as having the longest milk market channel from producer to consumer. The ward was furthest from urban market compared to the other three wards and it was also the area where the middlemen paid the lowest price.

4.1 Basic information

The results indicate that both men and women are involved in milk production. Out of forty farmers (producers) interviewed, 52.2 % were male and 47.5% females. The education level of the farmers ranged from no education to secondary education. Majority (52.5%) of the farmers had no education with women (32.5%) being the majority while only 20% were men had no education respectively (Figure 8). This indicates that the literacy level among the producers was high. The low levels of education among the women can be linked to culture which advocates that girls need no education as they are expected to be married off to prospective men who provide for their needs.

Figure 8: Education level based on gender



4.2 The milk chain actors, supporters and influencer

The results of that the milk marketing channel in study area have several actors from the producers (farmers), traders and consumers. The traders included the middlemen, wholesalers, vendors and retailers. The middlemen buy milk from the farmers at the farm gate in bulk and sell it to the wholesale, who in turn sell the milk to retailers or directly to the consumers in the main urban town of Kibaha. The retailers sell the milk direct to the consumers (hotels, restaurants and kiosks) for further sales and/or consumers. The vendors also buy milk directly from the producers but in small quantities and sell also in small quantities to local consumers.

The trader/middlemen determined the milk prices at both buying and selling points. The milk chain had other actors including the agro-vets who sold supplementary feeds to the producers while the ministry of livestock through local government provided extension service to the farmers. There was also a non-government organisation that assisted the producers in the construction of cattle dips, an important contribution to pest and disease control in milk production (Table 4).

Table 4: Function of milk chain actors and supporters/influencers

Actors	Functions
Producers	They raise cattle, produce milk and sell to customers
Agro vet shops	They sell supplementary feeds mainly maize bran and veterinary drugs
Middlemen	Collect milk direct from several producers and sell to traders
Traders	They collect milk in bulk from middlemen and producers
Retailers	They sell milk to the consumer
Consumers	The end user of the milk
Supporters/Influencer	
Local government	Provide extension service in animal health, Provide cooling facilities Maintenance of roads
Tanzania Dairy Board	perform regulatory activities search and develop markets register producers and processors of dairy and dairy products
Agricultural Sector Development Programme (ASDP)	Construction of cattle dips so that cattle remain health and produce more milk and meat

4.3 Milk production in Kibaha district

The aim of the research question was to find out the relationship between milk production and marketing in Kibaha. From the table above Mlandizi had the highest amount of milk produced and with more number of cross breed. The Soga ward had a least number of household keeping cattle but had higher milk production compered to Magindu, Kwala and Ruvu (Table 5).The milk produced in urban area in the year 2012 was 25×10^6 litres

Table 5: Milk production in Kibaha district

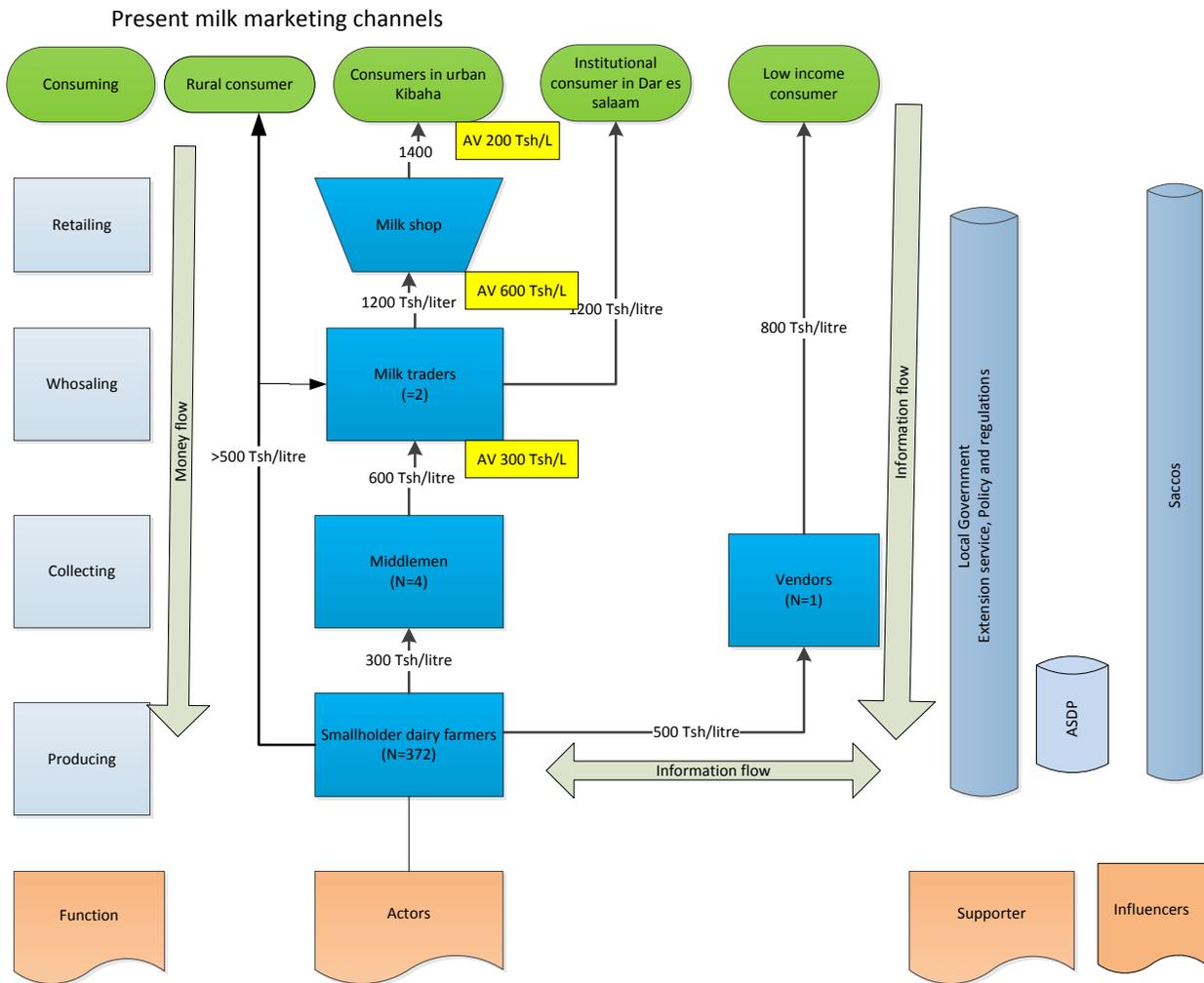
WARD	No of household keeping cattle	No of Cattle		Milk production in litres per year
		Indigenous breed	Cross breed	
Mlandizi	148	1756	1589	488,153
Magindu	102	27,367	49	150,000
Kwala	87	14,131	18	75,245
Ruvu	35	6454	50	65,706
Soga	29	130	1083	306,530
Total	401	49838	2757	1,049,288

Source: Kibaha district report, 2012

Marketing Channels

As demonstrated in (Figure 9) there were four different milk channels found in the areas studied. These includes: (a) direct sales which involves producers selling directly to the consumers, (b) producers selling through middlemen who then sell to traders, retailers and finally consumers, (c) producers sell to vendors. There were few vendors because nearly every household in this village had a milking cow (d) Producers sells to traders, from trader to consumers.

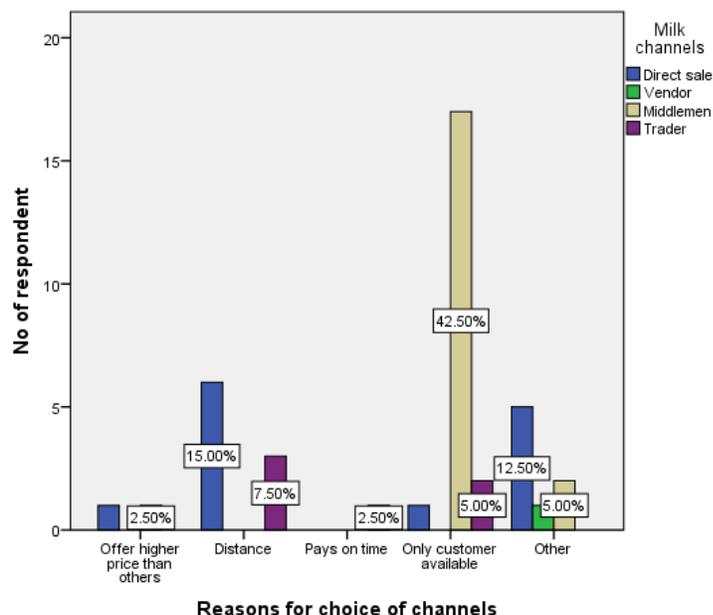
Figure 9: Milk chain map



Choice of Channels

The study shows that 42.5% of the producers were selling milk through middlemen as shown in (Figure 10). The bulk of the milk went through middlemen because there were no other competitors therefore farmers had no other choice. Besides milk was a perishable commodity and the farmers had no cooling storage facilities so they had to sell their milk to middlemen who were the only buyers available. The minority 2.5% of the producers sold their milk direct to consumers who were offering higher prices as their choice; these consumers included institutions in the locality such as the army and civil servants working in the vicinity. The producer to consumer channel offered the best prices because both the producer and the consumer negotiated on the prices to be paid

Figure 10: Choice of channels



4.4 Physical infrastructure for smallholder milk producer

Transport infrastructure

Through interview and observation it was noted that most of the roads were not in good conditions and some of them were under rehabilitation creating transport problems. The means of transport used for transporting milk were bicycle and motorcycle (Appendix 6)

Storage infrastructure

There were no storage facilities the morning milk was sold but not all the evening milk was sold. The result of the study indicate that 60% of the producer were producing between 17 -27 litres of milk per day, but 58% of the producer were selling between 5-10 litres per day indicating that some of the milk was not sold, it were consumed at home and after morning milking the calves were not seperated from there mother they were left to sulkle the milk (Picture 1)

Picture 1: Calves left to suck the milk



Means of communication

Majority 60% of the producer had mobile phones although not frequently used in villages were there were no electricity it were difficult to keep up with current related market information.

Milk collection centre

There were no milk collection centres that are owned by producers. The trader in Chalinze had a milk collection centre for the milk collected from the Mangindu Ward but for the Ward of Kwala, Ruvu and Mlandizi the traders had no specific place even alongside the road a temporarily collection point was established as shown in (Picture 2). This cause disturbance to smallholder farmers has they have no specific place to collect and sell the milk.

Picture 2: Milk collection



4.5 Milk Quality Requirements of the Milk Market

The study sought to know the milk quality requirements of the milk market (See Table 6). The options involved hygiene, water content, and milk fat.

Table 6: Milk quality

Quality requirement	%
Hygiene	27.5
Water content (adulteration)	12.5
Milk fat	2.5
Hygiene and water content	57.5
Total	100.0

Information from (Table 6) indicates that buyers of the milk were more concerned with two indicators of milk quality; namely hygiene and water content, which were mentioned by 57.5 % of the milk producers. Only 1 respondent (2.5 %) reported that the buyers were demanding milk fat as the indicator for milk quality as this milk was needed for making fermented milk. Milk density test was done by using a lactometer to check if there is added water (adulteration). From the lactometer reading milk was either accepted or rejected the accepted lactometer reading was

1.026-1.032 g/ml.(26-32 on lactometer reading). Deterioration of milk quality takes place during transportation from farm to the next selling place.

Likewise, the buyers, who were middlemen, traders, and retailers, provided similar responses in the interview. Representing the voices of buyers one of the trader said,

“I don’t buy milk from the middlemen before checking for freshness, cleanliness, and adulteration. I have an instrument known as a lactometer which I use to check for milk adulteration before I accept any milk from the middlemen. This makes the middlemen careful when they buy milk from the producer, who also check for the same from the milk producers”

4.6 Milk Market Information

Regarding the kind of information, options such as quality, price, and volume were provided.

Table 7: Information about milk marketing

	%
Source of information about milk market	
➤ Farmers	32.5
➤ Traders (Middlemen, vendor)	42.5
➤ Mass media	17.5
➤ Other	7.5
➤ Total	100.0
Kind of information about milk market	
➤ Quality	17.5
➤ Price	37.5
➤ Volume	10.0
➤ Quality and price	22.5
➤ Other	12.5
➤ Total	100.0

Results in (Table 7) indicate that about 75 % of smallholder dairy farmers got information about milk market from traders and farmers. Mass media was mentioned by about 17.5 % indicating that few farmers used mass media as their source of information because the prices were different with that at village and the information was not helping them to change the offered price, as they had no power to bargain and make decision. Smallholder farmers mentioned other sources of information about milk market being the government extension officers (7.5 %). The least kind of information 10% they received was about the volume of milk. 40% of smallholder farmers obtained information on quality and price, more of this information was obtained because traders had to provide information on quality because it was helping the traders to sell the product as milk was tested for quality before being received by the retailers.

4.7: Price determination

As shown in (Table 8) milk prices were determined by different actors. 20 producers out of 40 representing 50 % (Appendix 8) said that milk prices were set by middlemen which ranged 200-400Tsh per litre This price was quite low compared with the over 500 Tsh per litre price set by producers when selling direct to consumers within their vicinity. The middleman set such low prices because the milk producing villages were in accessible by vehicle due to poor road condition. Therefore the middlemen use motorcycles to transport milk to trader in Chalenze in Bagamoyo. The trader would then transport milk to retail outlets in Dare salaam. This implies

that the producer received poor prices due to poor roads and the long milk chain. Moreover, it implies that the shorter the chain the higher the price of milk and vice versa

Table 8: Price determination

	Who determines the Price				Total
	Middlemen	Vendor	Trader	Producer	
Price of milk per litre 201-300	13	0	0	0	13
301-400	7	1	0	0	8
>500	0	0	12	7	19
Total respondents (farmers)	20	1	12	7	40

Price and distance relationship

Twenty eight out of the forty producers lived more than 40 kilometer from milk market in Kibaha they were paid a price of 200-400 per Litre. 10 out of forty also lived less than forty Kilometer from Kibaha urban where they supply the milk, they were paid more than 400 Tsh per litre (Table 9) this means that the shorter the distance from the market place the higher the price of milk and vice versa. There were no milk producers leaving at a distance of 21-40 that were paid the price of 200-400 Tsh.

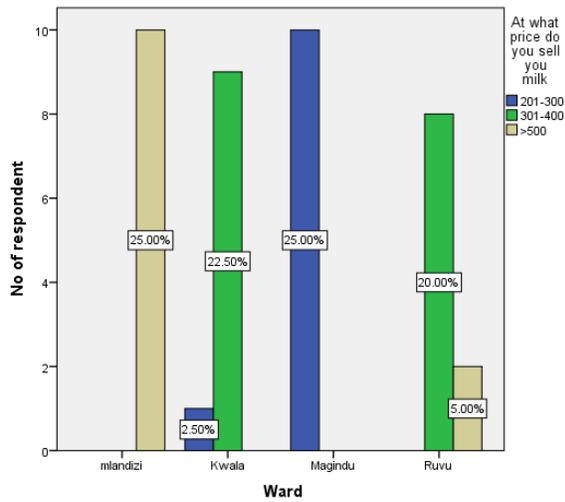
Table 9: Distance from producers to the urban market

		The distance from producers farm to Kibaha urban milk market in kilometers			Total
		21-30	31-40	> 40	
Price of milk	201-300	0	0	11	11
	301-400	0	0	17	17
	401-500	4	6	2	12
Total		4	6	30	40

Relationship of Price of Milk and Ward

The study showed that the Wards of Kwala and Mangindu are about 77 and 90 kilometers respectively from urban markets and they were paid 200-400 Tsh per litre of milk as shown in (Figure 11)

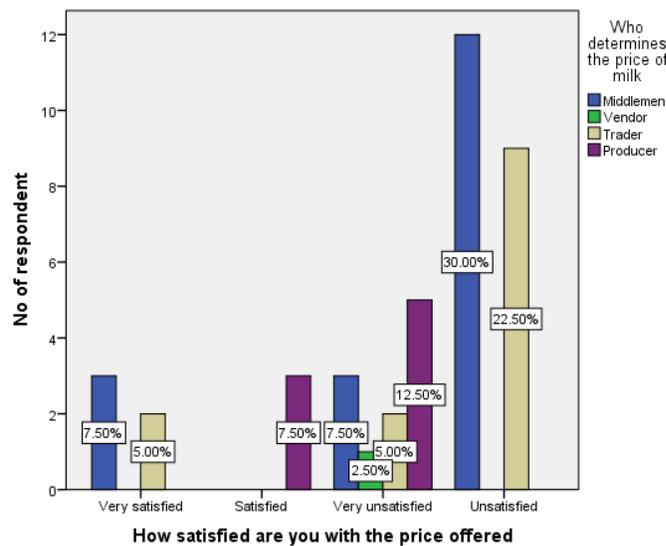
Figure 11: Relationship of price of milk and ward



Price satisfaction

The study showed that the majority of the producers 80% were not satisfied with the price of milk that was being offered by the buyers, as shown by cross tabulation of bargaining of power and farmers perception (Figure12) The price which farmers were not satisfied with was the 300Tsh/ litre that was being offered by the middlemen while 7.5% were very satisfied with price being offered these were farmers who were selling direct to institutions one of the institutions was the army at a price of 1000 Tsh/ litre .

Figure 12: Price satisfaction



Amount of milk produced and sold per day by the farmer

From the study it was observed that 60% of smallholder farmer were producing 17-27 litres of milk per day of these farmers 57.5% were selling between 5-10 litres of milk per day indicating that 62% to 70% litres of milk were not sold they were consumed at home and given to calves. The high rate of the consumption of milk has been contribute by insufficient milk market

access and traditionally for the Maasai milk its principal purpose is to provide for family nutrition as a basic diet item and is used in several of their rituals (See Table 10).

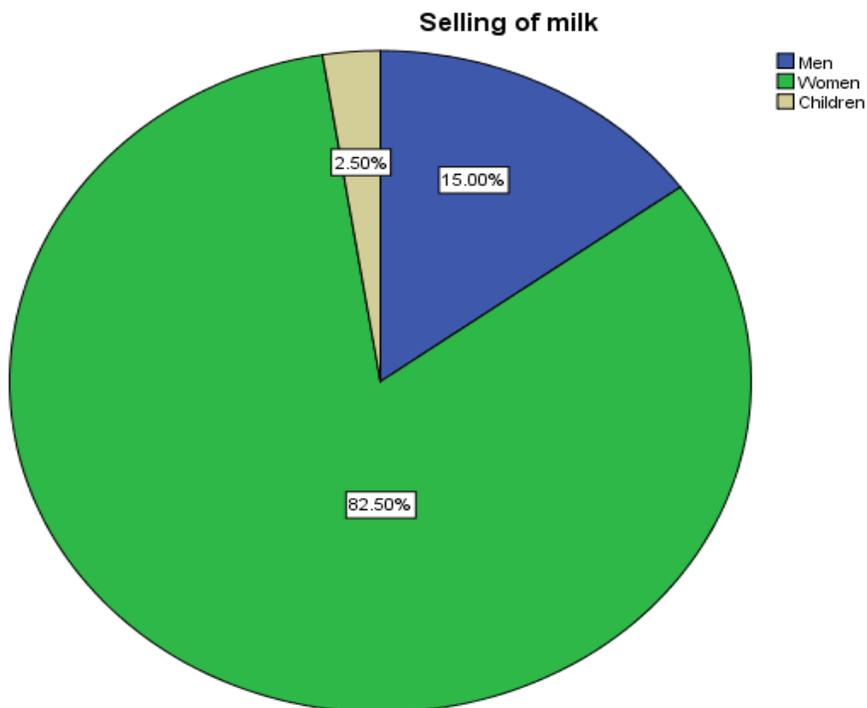
Table 10: Milk produced and sold per day

	Amount of milk produced per day					Total	%age	
	5-10	11-16	17-21	22-27	28-33			
Amount of milk sold per day	5-10	7	6	9	1	0	23	57.5
	11-16	1	1	2	6	0	10	25.0
	17-22	0	0	1	4	0	5	12.5
	23-28	0	0	0	1	1	2	5.0
Total		8	7	12	12	1	40	100.0
Percentage		20	17.5	30	30	2.5	100	

Responsibility of selling milk

In the survey conducted it showed that selling of milk was mainly done by women which is 82.5% of the respondent least involved in selling milk were children which was 2.5%. Children are less involved in selling milk as they go to school. Men were also less 15% because in the culture of Maasai and Sukuma tribe selling of milk is a woman's' activity (Figure 13)

Figure 13: Gender roles on Milk



4.3 Results for the Interviews

Interviews were conducted with the following actors and supports .Two middlemen, two traders, retailer and two government officers. Results are shown in Boxes 4.1 and 4.2.

Box 4.1

Interviews of middlemen

The first middleman was called Jack, Jack buys milk in Magindu ward in Kibaha district, because of poor road network connection to Kibaha urban, his forced to sell the milk to the next district of Bagamoyo in a town of Chalinze which is about 35 kilometre to the trader who has a cooling tank. Jack had entered into informal contract with farmers in four villages. This contract specified that the farmers will sell all their milk to Jack at a cost of 300 Tsh. According to the contract, Jack paid the farmers after every 10 days. He has employed five men and provides them with motorbikes. These employers would go every morning to collect milk from the producers using a motorbike as demonstrated in (Figure 13). And deliver it to the trader at Chalinze at 600Tsh per litre. Jack's employee would collect about 200-250 litres per day. The quality of milk was tested by using lactometer to see if there was water added.

The second middleman was called Joseph. Joseph was buying milk from producer he was the one setting the price of milk there was no negotiation. He checks on the quality of milk by using the lactometer. He had 3 employee that collect milk from farmers they are provided with bicycles they are paid 3000 Tsh per day he also employed one person who is provided with a motor cycle he pays him 5000 Tsh per day this one collects milk brought by those with bicycles as the milk collected by the ones with bicycles do not reach the traders collection point. He collects 100-150 litres of milk per day. There were no written contracts with farmers; he collected whatever volume of milk was found at the farm. The payment of milk was done after five days. He had a total of twenty smallholder farmers

Picture 3: Middlemen taking milk to collection centre(left) and checking for milk quality(right)



Box 4.2

Interview with the traders

The first trader to have interviewed with was a woman trade she is called Florence she has been doing this business for the past 10 years. She receives milk from smallholder farmer she pays them 800 Tsh per litre. She hires a place where the farmers deliver milk as collection point (Picture 4). She checks on quality of milk which includes milk density, cleanliness After the milk collection she hires a pick up and takes the milk for sales to the retailers in Dar es Salaam. The milk is sold at 1200 Tsh per litre, to the retailers in Dar se salaam who resale to hotels and restaurants she also receives milk from producers in Mlandizi ward which is about 35 kilometers from producer farm to Kibaha urban. And. she has informal contact with the producers. She doesn't buy evening milk because she lacks a cooling tank. She receives 500 litres per day but if she had a cooling tank she would purchase more milk. Payment is done after seven (7) days. She is the one who sets the buying price.

The second trader interviewed had a milk collection centre and a cooling tank with a capacity of 1600 litres. This collection centre is located in Bagamoyo district but he gets milk from middlemen who collect milk from producers in Kibaha district in the ward of Magindu this is so because of the geographical location. From Magindu to Chalinze is about 30 kilometers but from Magindu to Kibaha urban is about 98 Km, that's why the middlemen collecting milk from Magindu and sell milk to Chalinze. He buys milk at 600 Tsh per litre and transports them to Dar es Salaam where he sells to retailers at 1200 Tsh per litre. He has been in the milk business for 12 years he receives 800-1000 litres per day depending on the season. He has informal contract with the middlemen. Payment is done after every 10 days. He is the one who sets the buying price .Before he receives the milk he has to check for quality,

(Picture 4) which include testing for milk density, with a lactometer, alcoholic precipitation, colour and odour. The quality of milk was mainly check for adulteration and not for price setting

Picture 4: Trader milk collection point (left) and transporting milk to Dar es Salaam (right)



Interview with retailer

Interview with the retailer was done at Kibaha urban centre. The retailer receives milk from producers who live in peri urban areas he buys milk at 800 Tsh and sells at 1200 Tsh, he owns a milk shop, mainly the producers live about 15-20 kilometers from the urban centre.

Constraints faced by smallholder farmers in selling their milk

According to survey, farmers faced many constraints, these includes:

1. Low milk price
2. Sometimes the buyer collected milk from producers and did not return back to pay them
3. Unreliable buyers
4. Delayed milk payment though they have an informal contract to pay after 10 days
5. Insufficient trust. Sometimes buyers collected milk and during payment they would deduct some money claiming that the milk was rejected at milk collection centre.
6. Price fluctuation. During the dry season there increases in the price of milk and in the rainy season the price of milk drop.
7. Impassable roads especially during the rainy season

Constraints faced by middlemen in the milk business

1. Milk is a perishable product sometimes because of distance if I get breakdown of the motorcycle the milk get spoiled
2. The cost of transport petrol is expensive
3. Unreliable workers that the middleman hires to collect milk for him.
4. Scattered farmers difficult to collect milk
5. Frequent repair of bicycles and motorcycle due to poor condition of the roads

The middlemen gave the following suggestion for the improvement in the milk market

If the farmer have a place where they can collect their milk, it could reduce the cost of transport and farmers can get a higher price than the current one.

Constraints faced by milk traders

- They don't have a proper place to collect the milk
- Lack of trust there is no trader organization it is difficult to unite as they have different customers
- Imported milk powder is cheaper most of the café and kiosk mix powder milk with raw milk in preparing tea so the price of milk is low.
- Insufficient capital to buy a cooling tank so as to increase the volume of milk collected
- High transport cost
- Lack of capital
- No special place to sell milk
- Unreliable middlemen during the dry season they sell to other traders
- The rent of the premise is high
- Competitions in the milk market with big companies like Tanga Dairy Fresh

Interview with the extension officer

The extensionist is an employee of the local government. The main activities are to provide extension services such as advice, training when there is a new technology, treatment and vaccination. Her comment on the chain relationship she said there is a weak relationship because every actor works individually. Producers find their own customer individually, negotiate on price there is no specific price mechanism as it is controlled by demand and supply.

Suggestion for improvement she said smallholder farmers to formulate farmers groups which in future can be farmer's producer's organization. Establishment of a milk collection centre at the wards centre

4.6 The existing measure done by the government to support the milk market for smallholder farmers

Interview with the district veterinary officer

From the interview with the district veterinary officer the following measures as being taken by the government to support the smallholder farmers sell their milk.

-Studies are being taken to locate areas with collectable milk so as to improve milk collection and prompt payment of milk.

To provide conducive business environment the government has exempted import duties for milk collection equipment, transportation and milk packaging materials

-Support the Tanzania Dairy Board.

She said that they are aware of the problem of the small farmer in getting market for their milk produce but the problem is the insufficient fund that is provided by the government already they have managed to provide farmer cooperative in Mlandizi with a cooling tank. The management of the cooling tank is managed by the members themselves. Suggestions for improvement as suggested by the veterinary officer are

1. Construction of milk storage facilities at 3 wards which are Kwala, Magindu and Ruvu
2. Working with the Tanzania Dairy Board to create awareness campaign for people to drink milk
3. Continue improvement through breeding of dairy cattle so as to increase quality and quantity of milk.
4. To provide training to livestock keepers (FFS) on proper livestock husbandry and entrepreneurship including marketing of livestock and their products (milk and meat).

Farmer's organization

The study sought to know if there were dairy farmer organisations in the area and if the farmers were members. The four wards surveyed Magindu, Kwala Mlandizi and Ruvu the majority of the producers 72% were not members of dairy farmer's organization they were members of other village groups. It was for the producers who said they had farmer organization 25 % were from the Ruvu ward as shown (Table 11). The main reason for not having dairy farmers organization were insufficient motivation and lack of trust

Table 11: Farmers' organisation

WARD	farmers organization				Total
	Yes	%age	No	%age	
Mlandizi	1	2.50	9	22.50	10
Kwala	0	0	10	25.00	10
Magindu	0	0	10	25.00	10
Ruvu	10	25.00	0	0	10
Total	11	27.5	29	72.50	40

The SWOT analysis

The SWOT analysis has been used as a tool to look at the Strength, Weakness, Opportunities and Threats that are being faced by the smallholder farmer in their milk business as it is shown in (Table12)

The tool has been used to find the internal and external factors of the smallholder farmer so as to know the impact of the weakness and threat that affect the performance of the smallholder farmers by identifying the weakness you can know the steps to take to minimize them

Table 12: SWOT analysis

STRENGTHS	OPPORTUNITIES
<ul style="list-style-type: none"> • Tradition of drinking milk among pastoralists and agro-pastoralists, motivates them to increase production • Experience in livestock keeping • Women are the one in control for the income from the milk sells for the case of Maasai tribe • Provide employment and is a source of food hence increase the nutritional status of the people • Quality of milk was checked • The taste of milk from indigenous cow more preferred by consumer • 	<ul style="list-style-type: none"> • The growing demand of milk and milk product in the neighboring commercial city of Dar es salaam • Government policy on poverty alleviation • Agro-climatic condition that favour the keeping of cattle of moderate high milk production • Availability of land for grazing
WEAKNESSES	THREATS
<ul style="list-style-type: none"> • Absence of entrepreneur skills • Chain actors not well coordinated • Insufficient communication especially on price information • There is no product differentiation milk is sold as raw milk with no added value • Low level of education affect to make sound decision in the business • other pastoralist move from place to place no permanent place so difficult to make development plan • Insufficient cooling facilities cause evening milk not to be sold 	<ul style="list-style-type: none"> • Presence of tsetse flies causing diseases to cattle • Imported milk that compete with domestic market • Promotion of other beverages as compared to milk • Poor road infrastructure • Drought causing scarce of pasture • No government body that control the milk price.

CHAPTER 5: DISCUSSION

This chapter gives a discussion on two areas, present milk marketing channels for the smallholder milk producers in Kibaha district and the barrier for these producers to sell milk to urban markets.

5.1 Present milk marketing channels of the smallholder milk producers

5.1.1 Function of different actors in the milk marketing channels and their relationships

There were five (producing, collecting, trading, retailing and consuming) functions of the actors: that were identified from the study. The farmers included both men and women mainly involved in producing the milk. The middlemen bought the milk directly from the farmers at the farm gate and took the milk to a collection points from where the traders bought the milk and delivered the milk for sale to the urban markets. Some traders were also involved in buying milk directly from producers and delivering the milk for sale to retailers in the urban markets. The biggest challenge observed at producing the milk is poor linkage among the farmers. Farmers currently sell milk individually reducing their bargaining power. Lack of collective marketing led the buyers (traders and middlemen) to move from one farmer to the other to buy milk leading to coverage of long distances. This has an implication on the milk prices paid to the farmers as the traders had to make their profits (Omoro *et al* (2009). There is positive correlation between price received and distance (Stanney (2009).

The results further indicated that majority 80% of the farmers (Figure 11) were not satisfied with the price that was being offered but they had no choice only to accept the price offered if they refused the price the buyer moved to other producers. The milk prices were determined by the middlemen (Figure 11). According to Rajendran *et al.* (2004) and Tariq (2008) in Pakistan, intermediaries dictate the price and that marketing of milk in rural areas is mainly determined by middlemen.

The transparency of pricing affects also the relationship between milk producers and traders. The basis of price setting was not known among the producers, information of milk price in the urban markets are not shared by the traders, and producers were sometimes paid less money that did not match the volume of milk sold as the middlemen told them that the milk was rejected at the trader's milk collection point and there was no way of verifying this claim from the middlemen. KIT and IIRRI (2008) cited that farmers and traders benefit if they achieve to make their chain relationship more stable, well organised and transparent.

Weak relationship among the actors in the marketing channels was also observed. The milk channels were not coordinated and only informal contracts existed between the producers and traders and each can easily switch partners making marketing unstable. According to Fafchamp (2004) when weak institutions exist, markets do not function efficiently.

5.1.2 Milk production and sales

From the study 17-27 litres were produced per day but only 5-10 litres were sold this indicate that not all the milk that was produced and intended for sell was sold. From the interview with the farmers, the evening milk was not sold it was used for home consumption or left for the calves to drink this is in line with report by Njombe, *et al* (2010) who reported that due to remoteness and poor infrastructure, milk produced is mostly consumed locally and a significant amount is left for the calves. (NIRA'S, 2010) reports 90% of the milk produced is consumed at farm and only 10%

is sold (Masterjohn, 2011), reports that for the Maasai milk is a regular part of their diet and for ritual purposes such as a gift .

5.1.3 The role of supporters

Based on the result of the study, it was only the government through the Ministry of Livestock and Tanzania Dairy Board that support the dairy chain. Their functions include research and extension services however these services were not readily available to the farmers due to insufficient transport to facilitate the extension workers to reach the farmers. In addition, they also make laws which are useful for safeguarding the dairy sector by establishing regulatory bodies that has mandate over the quality standard of raw milk and other processed agricultural products Dillmann (2011). These can be the reasons why there is lack of technology, low milk quality and low level market information. The cooperation and coordination with relevant organizations are key to success in developing the chain (KIT and IRRI, 2008).

On the other hand, the smallholder farmers in the three wards of Mlandizi, Kwala and Magindu had no farmer organization they had different opinion for not having the organization, for the case of Mlandizi they had farmer organization which collapse due to poor management but they are in the process to reform it again According to Hellien et al,(2007) the reason why farmer organization fail is because they are encouraged to over reach themselves by developing agencies who wish to improve farmer' access to markets but fail to recognize fully the constraints to achieving this collection action. There is a need to link farmer's skill and managerial experience. For the case of Mangindu they would like to have an organization or collective groups create awareness to them. Erickson, (2011) reports a similar situation noticed in Kenya in the district of Kwale the farmers in that rural area had no electricity but joining and forming a dairy cooperative they received a solar icemaker a method of providing ice and refrigeration to rural farmers which was funded by the Heifer International the problem of milk spoilage is now solved in that area (Appendix 4).

5.1.4 The influencers

In supporting smallholder milk producer the government has motivated smallholder farmers to form farmers cooperatives, as it was done in Mlandizi and then assisted them with cooling tank this is in line with report of (Njombe, *et al* 2011) on the government policy and measures taken to alleviate poverty in rural areas the emphasis is to improve infrastructure such as milk collection centre, power supply, road network and transport facilities.

5.2. Barriers in accessing the urban market

5.2.1 Milk markets quality requirements

From the study thirty out of forty smallholder farmers lived more than fifty (50) kilometers from Kibaha urban centre their milk were sometimes rejected because the time the middlemen spent on the way from producer to the collection centre was more than 3 hours this affects the quality of milk according to (Pandey, 2011), raw milk is highly perishable and as such needs to be quickly transported to consumption centre or to be processed into another form, to maintain the original quality ,milk has to be cooled to 4⁰c within 2-3 hours after milking. To avoid milk spoilage traders could not buy evening milk because they had no cooling facilities like cooling tank. Milk need to be chilled on collection to increase the shelf life of the milk during transportation. In the study done by Karuga (2009) observed that in Timau area in Kenya smallholder farmer sell only morning milk through the formal milk market channel and evening milk was sold to informal market at a price of 18Ksh/ litre compared to morning milk which was sold at 24 Ksh/ litre this was largely due to lack of coolers which prolong the shelf life of milk.

From the study the quality of milk was not checked as indicated by the dairy Act of Tanzania 2004 (Appendix 9) this pose a risks to consumer due to presence of pathogens in the milk and environmental contamination (Swai *et al*, 2011)

5.2.2 Physical infrastructure

Road infrastructure

From the interview with the traders, producers and government officers reviewed that poor road infrastructure contributed to the poor market benefit particularly to the farmers. The poor road networks forced the traders to go long distances from the producer to the market. A study conducted by (Moser, *et al* 2009) noted that transport cost from local market often consume 25%-75% of the destination market price making spatial arbitrage unprofitable and leaving rural market isolated. Poor state of roads in rural areas affects the ability of cattle keepers to attract many buyers due to increased transport cost (Musemwa *et al*, 2008). Half percent (50%) of the producers were leaving in areas with very poor roads, impassable by vehicles. Most of the buyers used motor cycles or a bicycle (Appendix 6) covering long distances to collect the milk, a situation that requires that they make several trips (Njombe *et al.*, 2010). The buyers have to also move from within the district into another district. For example, due to the fact that there was no road connecting Magindu and Kibaha urban market, traders had to go through Chalinze town in Bagamoyo district to reach Kibaha urban and Dar es salaam urban markets. This increases the distance by 125 Kilometers adding to the cost of transportation which is translated through the milk prices making milk expensive for the consumer and less pay for the farmer.

Collection Center

Through interview it was noted that there were no formal milk collection centre. The collection points were temporally and they were not recognized by the municipality. In Tanzania the informal market is not actively addressed by the government even though selling of milk is officially prohibited, (Linden *et al* 2009).It is a risky because the trader can collect the whole one week milk and decide not to pay, farmers have nowhere to go and claim .In Mlandizi after organization failed farmers had nowhere to collect their milk so another farmer organization in the next district of Kinondoni in Dar es salaam, they have a milk collection centre they hire a person to collect the milk from the farmers in Mlandizi at a price of 800 Tsh/litre the 100 Tsh extra is for Transport cost. The problem is that they have a limit they cannot take more than 100 litres per day this affect other farmers who have nowhere to sell the milk. Apart from that the trader had no specific place to collect the milk even alongside the road he could establish a collection point (Picture 2).Having no collection point contributed to reduced price at farm level because the middlemen had to cover long distance to reach individual farmers who were scattered in the village.

5.2.3 Access to information

From the study the main source of information is from traders which was 42%.The kind of information shared was mainly on price and quality. Farmers were no satisfied with the information obtained from traders about price. This situation was supported by (Bienabe *et al* 2004) who stated that middlemen have opportunistic behaviour they don't provide the right information on the milk market price. The government radio broadcasting that is supposed to be a reliable source of information on market price is only accessible to 17% of the farmers.

It was important for the trader to inform the farmer about quality because traders are supposed to supply good quality milk to the retailers, because this could have an effect on the transactions this means farmer relied on traders to inform them about price and quality. According to KIT *et al.* (2008), in Africa it is difficult for the farmers to get reliable information on the supply, demand and prices of food. Such a situation is exacerbated when the trader is the only source of

information on price and other relevant market information. Information on price becomes significant to farmers when they can make use of it. This implies that there is low level of information that resulted to the low bargaining position and limits the option of farmers in trading their milk thus becoming a barrier in accessing to the market.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

They were four different channels that were identified in the study which are Direct sale, Producers-middlemen-traders-retailers-consumer, producers-traders-consumers and producer-vendors. There was no processing; the study also shows that farmers used to sell their milk individually, therefore farmers were not organized in any form of collective groups that could be used as platforms to lobby for prices from the middlemen so as to improve the bargaining power in price determination. Due to this lack of bargaining, the middlemen took advantage of this situation that is, buying milk at a lower price from the producers. In addition, the limited support from organizations and weak reinforcement of laws and regulations of the milk sector, and ad hoc arrangement in buying and selling contributed to the weak relationship that existed among the actors in the marketing channels.

This study shows that, poor road network is the main barriers to small holder dairy marketing in Kibaha district. For instance, milk from the villages cannot reach Kibaha town where there is a ready market because there is no road that connects the village with the town. The only roads connecting the villages with Kibaha town are foot paths which cannot be used by cars. Due to this lack of road network connecting the villages with the Kibaha which is the main town, farmers are left with the only option of taking their milk to Chalinze town in Bagamoyo which is a another district in the north of Kabaha. Therefore middlemen from Chalinze use motorbike to come and buy milk in these remote villages. The long distance covered by these middlemen makes them to pay low prices to the farmers. Low prices are also attributed to the fact that the middlemen are the ones that determine what prices to pay to the farmers and since the farmers have no other options they accept whatever pay they are offered. In this way farmers do not get what is worthy their pay.

The local government supported the farmers with extension services in animal husbandry practices and in Mlandizi they provided the farmers with a cooling tank.

The study shows that long distance to the urban markets had effect on the quality of milk as it took long time from producer to the traders this caused milk to be rejected

The flow of information was top to bottom such that producers had no voice. This contributed to lack of decision making on market prices.

The source of information was mainly from traders and they provided information for their own interest which was about the quality of milk.

6.2 Recommendations

Farmers

- Milk is an important economic source for improved rural livelihood among the communities in Kibaha district. However this cannot be achieved without proper farmers' linkages with the market, there is a need therefore for the farmers to be organized into marketing groups. This will enhancing the farmers bargaining power on the milk prices through negotiation with the buyers on the prices. This is expected to bring about equal distribution of benefit along the milk marketing channels, allowing the farmers particularly to realize their profit. This kind of intervention (formation of collective marketing groups) requires government and other development support in capacity building for the farmers.
- The farmers have to share the transportation cost of their produce

- The Producers-traders consumer marketing channel would be the best choice for smallholder farmers as it will reduce the transaction cost

Extension

To the extension workers it is recommended to plan of outreach programme where farmers are trained on improved milk production, value addition, basic marketing skills and milk hygiene. To assist the farmers in formation of collective marketing groups

Ministry of livestock and fisheries development

While it was noticeable that the government has no authority in the price setting for milk, the Ministry of livestock and fisheries development under the department of animal production and marketing can assist the farmers by making market information on milk prices available to the farmers using the existing institutions such as the milk dairy board of Tanzania. This information can be made readily available at the village office where by farmers can easily reach

Local government

The infrastructure which was found to be a major challenge for the small holder farmers linkages with the milk market need to be enhanced. Infrastructure development is not one ministry responsibility. It requires collective action by the government through relevant stakeholder including the local government, ministry of works and infrastructure and the communities. This will enhance transportation of the milk from the farmers to the urban markets. Road connectivity linking the remote villages with the urban markets, is prudent for improved milk marketing thereby reducing the cost of transportation and improving the actors benefits.

Suggestion for further study

Further research on factors contributing to the dominance of the informal marketing channels as compared to the formal channels

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APPENDICES

Appendix 1: Questionnaire for smallholder dairy farmers

A) Basic information

1. Gender: Male Female 2. Ward _____
3. What is your age: 18 to 25 year's 26 to 33 years 34 to 41 years 42 to 49 above 49 years
4. What is education level: Informal Primary Secondary Tertiary?

(B) Milk production

5. What breed of cow do you keep?
- (a) Indigenous (b) Crossbreed
6. How many milking cows do you have?
- (a) 1 to 3 (b) 4 to 6 (c) 7 to 9 (d) 10 to 12 (e) above 12
7. What is the amount of milk produced per day?
- (a) 5 to 10 litres (b) 11 to 16 litres (c) 17 to 21 litres (d) 22 to 27 litres (e) 28 to 33 litres
8. Do you use supplementary feeds Yes No
- If yes which ones do you use?
- (a) Maize bran (b) Molasses (c) Seed cake (d) Others Specify

(C) Milk marketing

9. To which customer do you sell your milk?
- 1) (a) Direct sale (b) Vendor (c) Middlemen (d) Other (specify)
10. What is the reason for the choice of this customer?
- (a) Offer higher price than others
- (b) Distance
- (c) Pays on time
- (d) Only customer available
- (e) Others (specify)
11. How many litres of milk do you sell per day?
- (a) 5 to 10 litres (b) 11 to 16 litres (c) 17 to 22 litres (d) 23 to 28 litres (e) above 28 litres

12. How much milk is for home consumption?

(a) 1 to 3 litres (b) 4 to 6 litres (c) 7 to 9 litres (d) 10 to 12 litres

13. In the household who does the milk marketing

(a) Men (b) women (c) Children (d) Other Specify

14. At present what price do you sell your milk?

(a) 200 - 400Tsh (b) 500 – 700Tsh (c) 800 – 1000Tsh (d) >1000Tsh

15. Are there changes in price over time Yes No

If yes what are the reason for the changes in price_____

16. Who determines the price of milk?

(a) Buyer (b) Myself (c) Bargaining between buyer and producer (d) Other (specify)

17. How satisfied are you with the price offered?

(a) Satisfied (b) Very satisfied (c) Unsatisfied (d) Very unsatisfied

18. What is the distance from your farm to Kibaha urban milk market?

(a) 10 to 20 km (b) 20 to 30 km (c) 30 to 40 km (d) 40 to 50 km (e) above 50 km

C) Farmer organisation

19. Is there any farmers organisation in your area: Yes No

(a) If yes are you a member of that organisation Yes No

(b) If yes is it assisting the members to market the milk: Yes No

If no what are the reasons_____

(D) Milk quality

20. What milk quality is demanded by the buyers?

(a) Hygiene (b) Water content (c) milk fat (e) other (specify)

(E) INFORMATION

21. Who provide you with information about milk business

(a) From other Farmers (b) Trader (Middlemen, Vendor) (c) Mass media

(d) None

(e) Other (specify)

22. What kind of information do you get?

(a) Quality (b) price (c) volume (e) other (specify)

23. What constraints do you face in marketing your milk?

(E) INSTITUTIONS/ORGANISATION

24. Which institutions give you support in your business?

(a) Government (b) NGO (c) Bank (d) Others (specify) (e) None

25. What kind of support do you receive from the mentioned institutions?

(a) Training (b) Credit (c) Marketing (d) Extension service (e) Others (specify)

Appendix 2: Check list for Middlemen

- Experience in the milk business
- Challenges in doing the milk business
- Means of milk transport
- Quality of milk demanded
- Cost incurred in getting milk to market
- Volume of milk purchased
- Method of payment
- Suggestion for improvement in milk marketing
- Basis of trading

Appendix 3: Check list for trader

- Present situation of the milk marketing channels
- Criteria for milk price determination
- Quality requirement of milk
- Challenges in milk marketing
- Suggestions for improvement in milk marketing
- Information flow among the actors
- Cost incurred in milk business
- Basis of trading

Appendix 4: Check list for government officers

1. What is the government support in?

Milk production

Milk quality

Milk price

2. Current measure to assist smallholder farmer market their produce?

3. What is the policy governing smallholder dairy farmer?

4. Suggestions to improve milk marketing

5. Programmes to ensure sustainable milk marketing

Appendix 5: List of people contacted to get information

NAME	PLACE	CONTACT
Dr. V. Kessy	Ministry of livestock and fisheries Development	msafirikyesi@gmail.com
Mr. Desdery Rwezaura	Ministry of Livestock and Fisheries Development	desderyrwezaura@yahoo.com
Mr Gabriel Lyakurwa	Zoosanitary inspector Kibaha check Point	0025575439329
Mr Hamza Chiguma	Zoosanitary inspector Kibaha check Point	musendo@yahoo.com
Fulgence Rutakyamirwa	Zoosanitary inspector Kibaha check Point	+255786892630
Dr.Mayasa Ayoub Simba	Registrar Tanzania Dairy Board	mayasasimba@gmail.com
Mr.Deagratius Mlay	Tanzania Dairy Board Dairy technical service dept manager	deomlay@gmail.com
M/s Nancy	District Livestock Officer Kibaha	<u>nasembakihara@yahoo.com</u> nasembakihara@gmail.com
Mr. Joseph Makomo	Livestock officer Kibaha	josephmakomo@gmail.com
Mr. Sulusi	Extension officer Mlandizi	+255754442650
Mr. Chingilile	Extension officer Magindu	+255686801833
Mr. M. Kyande	District livestock officer Kibaha urban	+255783354937,+255715354937
Mr. M. Malley	Kwala quarantine station	Malley.marco@yahoo.com
M/S. D. Mahambo	Extension officer Magindu	+255786677176
Mr. P. Kimicho	Extension officer Kwala	+255784665938

Appendix 6: Means of milk transport to a milk



Appendix 7: Solar cooling tank

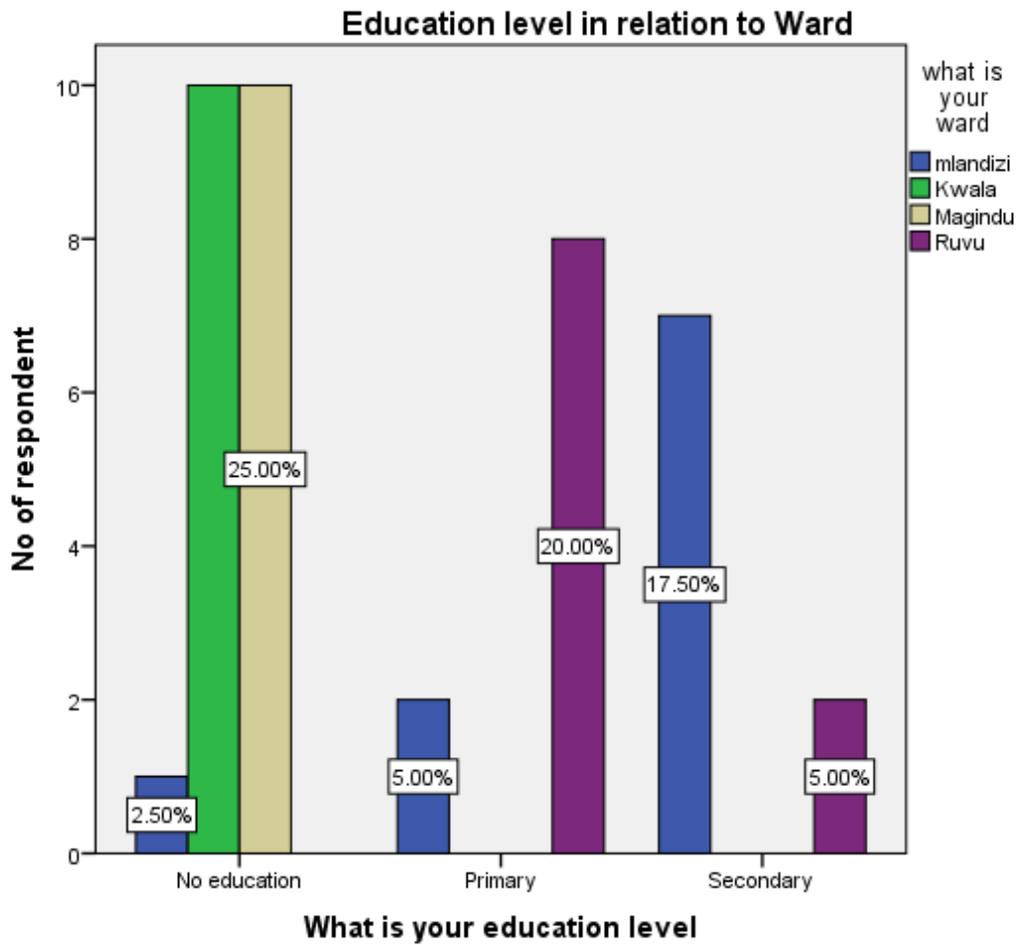


Three ISAAC Solar Icemakers

Appendix 8: Litres of milk sold per day

	Frequency	%	Valid %	Cumulative %
5-10	23	57.5	57.5	57.5
11-16	10	25.0	25.0	82.5
Valid 17-22	5	12.5	12.5	95.0
23-28	2	5.0	5.0	100.0
Total	40	100.0	100.0	

Appendix 9: Education level in relation to Ward



Appendix 10: The dairy industry Act of Tanzania 2004

The act applies to milk and milk product that are intended for sale, (Dairy industry act, 2004).

a)Condition for sale of milk.

1. No person shall sell milk unless the milk has passed platform test". These test are on milk density, odour, colour, alcoholic precipitation and clot on boiling.
2. Any milk which contains substance other than milk components shall be termed as adulterated milk.

b) Weighing and grading of raw milk

Raw milk is defined as" normal mammary secretion of dairy animals obtained from a healthy animal at one or more milking without either addition to it or extraction from it and intended for consumption as liquid milk or further processing" ,(Dairy industry act, 2004).

Every shipment of raw milk supplied by a producer shall be weighed and graded according to the regulations.

c). Restriction on dealing with raw milk

1. No person shall sell or distribute to the public any milk for human consumption unless such milk has been pasteurized, sterilized or subjected to such treatment to render it safe for human consumption.
2. Persons handling raw milk shall be routinely medically examined clean in person and habits and shall put on protective clothing.

Appendix 11: Interviews



Interview with extension officer



Filling questionnaire with small holder farmer