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# Understanding the drivers of milk consumption in Kenya

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A thesis  
submitted in partial fulfilment  
of the requirements for the Degree of  
Master of Commerce (Agricultural)

at  
Lincoln University  
by  
Sharon Chemweno

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Lincoln University

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Abstract of a thesis submitted in partial fulfilment of the  
requirements for the Degree of Master of Commerce (Agricultural)

Understanding the drivers of milk consumption in Kenya

by

Sharon Chemweno

Kenya's dairy industry has an annual milk production of close to five billion litres. The industry contributes about 8% to the GDP and employs an estimated one million people at the farm level. Despite the positive contribution of the industry to the economy of Kenya, it has a highly fragmented supply chain comprised of formal and informal sectors that supply processed and unprocessed milk, respectively. The informal sector dominates the industry, and this is brought about by the fact that Kenyans choose raw milk over processed milk, despite extensive concerns over safety issues reported frequently in the media. These issues reinforce the decision by the Kenya Dairy Board to ban milk sales in the informal sector. Consequently, the study aimed to increase our understanding of consumers' milk purchasing behaviour in Kenya, thereby providing insights into the demand drivers for fluid milk in Kenya.

Primary data were collected by means of semi-structured questionnaires distributed to 539 respondents in Uasin Gishu and Nairobi Counties. The data were analysed using binomial logit regression and Nvivo. The findings of this study revealed that education, employment status, family composition, product and packaging preferences and consumers' perceptions of, and trust in, milk sellers were significant determinants of their purchasing behaviour. Surprisingly, price was not found significant in the regression model but emerged as an important theme in the qualitative analysis. The results indicated that consumers were driven to purchase milk based on the trust they have with the seller; they also selected outlets based on their preference for the type of milk sold. Most consumers reported boiling milk before consumption regardless of its origin, reflecting a high degree of risk aversion. The qualitative data analysis suggested that enhanced safety regulations and improved traceability systems would help grow the formal milk marketing channels and ensure the safety of milk sold from farm to bottle.

The results offered insights into the characteristics and perceptions of the Kenyan dairy consumer as well as useful information to policy-makers and industry stakeholders while contributing to the limited knowledge of the use of milk dispensers.

**Keywords:** Kenya, dairy sector, milk dispensers, formal sector, informal sector, consumer behaviour, milk marketing channels, milk dispensers, binomial logit regression

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# Table of Contents

<b>Abstract</b> .....	<b>ii</b>
<b>Acknowledgements</b> .....	<b>iv</b>
<b>Table of Contents</b> .....	<b>v</b>
<b>List of Tables</b> .....	<b>vii</b>
<b>List of Figures</b> .....	<b>viii</b>
<b>Abbreviations</b> .....	<b>viii</b>
<b>Chapter 1 Introduction</b> .....	<b>1</b>
1.1 Introduction .....	1
1.2 Research background.....	1
1.3 Milk outlets in Kenya .....	2
1.4 Significance of the study .....	3
1.5 Study objectives .....	4
1.6 Organisation of the thesis.....	4
<b>Chapter 2 Literature Review</b> .....	<b>5</b>
2.1 Introduction .....	5
2.2 Formal and informal sectors: definition and approaches.....	5
2.2.1 Background and overview of the Kenyan dairy industry .....	6
2.2.2 Structure of the dairy sector in Kenya .....	7
2.2.3 Regulatory framework in the dairy sector in Kenya .....	8
2.2.4 Milk processing and handling in Kenya.....	9
2.3 Relevant theories for understanding consumer behaviour.....	10
2.3.1 Theory of planned behaviour.....	11
2.3.2 Random utility theory .....	12
2.3.3 Theory of reasoned action approach .....	13
2.3.4 Discrete choice theory .....	14
2.4 Empirical evidence on factors that would influence the demand and consumption of fluid milk.....	15
2.4.1 Socio-economic and demographic factors.....	16
2.4.2 Health and safety .....	16
2.4.3 Price sensitivity .....	17
2.4.4 Forms of packaging .....	17
2.4.5 Type of channel.....	18
2.4.6 Distance to market.....	18
2.4.7 Issues specific to countries .....	19
2.5 Research gap and relevance of study .....	20
2.6 Conceptual framework .....	21
<b>Chapter 3 Data collection</b> .....	<b>23</b>
3.1 Study area .....	23
3.2 Survey design .....	24
3.2.1 Survey preparation.....	25

3.4	Data analysis method.....	27
<b>Chapter 4 Descriptive Statistics .....</b>		<b>28</b>
4.1	Introduction.....	28
4.2	Univariate analysis .....	28
4.2.1	Milk consumers' characteristics.....	28
4.2.2	Characteristics of milk marketing channels .....	33
4.2.3	Sources of information for dairy products.....	34
4.2.4	Primary choice of milk outlet.....	35
4.2.5	Attitudes and perceptions .....	37
4.3	Milk dispensers.....	41
4.3.1	Use of dispensers .....	41
4.4	Preference towards processing level and bivariate analysis .....	41
4.4.1	Introduction .....	41
4.4.2	Educational level perception .....	42
4.4.3	Income perception.....	42
4.4.4	Household head .....	43
4.4.5	Safety, trust and risk .....	43
4.4.6	Perceptions about the use of dispensers.....	44
4.5	Text analysis .....	47
4.5.1	Responses to open-ended questions regarding the behaviour of the use of milk dispensers .....	47
<b>Chapter 5 Empirical analysis of the choice of milk outlet.....</b>		<b>49</b>
5.1	Data considerations .....	49
5.1.1	Data reduction .....	49
5.1.2	Data suitability .....	51
5.2	Logistic regression.....	54
5.3	Summary .....	57
<b>Chapter 6 Discussion, Recommendations and Conclusions .....</b>		<b>59</b>
6.1	Introduction .....	59
6.2	Key findings .....	59
6.3	Recommendations .....	61
6.3.1	Policy implications.....	61
6.4	Study limitations, contributions and future research.....	63
6.4.1	Study limitations .....	63
6.4.2	Study contributions and future research.....	63
6.5	Conclusions .....	64
<b>References .....</b>		<b>65</b>
<b>Appendix A Survey Questionnaire .....</b>		<b>74</b>

## List of Tables

Table 1: Summary of empirical findings.....	19
Table 4: Gender of respondents.....	28
Table 5: Respondents' monthly income.....	30
Table 6: Number of milk consumers in the counties .....	33
Table 7: Consumers who boil milk .....	36
Table 8: Reasons for boiling milk .....	36
Table 9: Information on use of dispensers.....	41
Table 10: Gender of household lead vs preference of milk .....	43
Table 11: Preference of milk type and whether they boil before consumption.....	43
Table 12: Reasons for boiling milk before consumption.....	44
Table 13: Behavioural use of dispensers.....	47
Table 14: 5 Components achieved .....	49
Table 15: Indexes achieved .....	51
Table 16: Variables showing linearity .....	52
Table 17: Checking for outliers.....	53
Table 18: Binomial regression results .....	55
Table 19: Marginal effects of significant variables.....	56



## List of Figures

## Abbreviations

KCC	Kenya Cooperative Creameries
KDB	Kenya Dairy Board
DTA	Dairy Traders Association
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
ILRI	International Livestock Research Institute
KES	Kenya Shilling
PCA	Principal Component Analysis
SDP	Smallholder Dairy Project
SSMV	Small Scale Milk Vendors
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action

# Chapter 1

## Introduction

### 1.1 Introduction

This section presents an overview of the Kenyan dairy industry and the milk outlets present in Kenya. This is followed by the purpose and significance of the research and concludes with an outline of the thesis.

### 1.2 Research background

The Kenyan dairy industry is one of the largest industries in Sub-Saharan Africa, and it has the capacity to sustain both domestic and international markets. The importance of the dairy industry to the growth and development of Kenya's economy has been remarkable since Kenya received its independence in 1963. This has been evident in the growth of the industry, at 5-7% annually over this time, while providing employment for 1.2 million citizens (Kenya Dairy Board, 2018). The dairy industry contributes 14% of the agricultural gross domestic product (GDP), 40% of the livestock sector, and 8% of the national GDP. It feeds a population of approximately 46 million people (Kenya National Bureau of Statistics, 2009) who consume between 50 and 150 litres of milk per capita per year and thereby make Kenyans the highest per capita consumers of milk in Africa (Bosire et al., 2017; Kaitibie, Omore, Rich, & Kristjanson, 2010; Muriuki, 2011).

Similar to other Sub-Saharan African countries (Uganda, Tanzania, and Malawi), Kenya's dairy sector demonstrates the predominance of smallholdings for the production of milk, and the existence of formal and informal distribution channels that market pasteurized and unpasteurized milk, respectively (Revoredo-Giha & Renwick, 2016). The smallholders total 1.8 million. They produce 80% of the total milk in Kenya while owning two to three cows per hectare of land. These farmers also practice subsistence and commercial farming alongside

keeping cows (Rademaker, Koech, Jansen, & van der Lee, 2016; Rufino et al., 2013). The estimated total production of five billion litres of milk produced annually from approximately 2.5 million dairy cows, shows the importance of the sector, which provides employment to many Kenyans as well as meeting their nutritional needs.

The dairy sector is characterized by a dual distribution market consisting of formal and informal sectors, with most of the total milk production channelled through the informal sector. This sees approximately 86% of milk sold in the informal channel with 14% in the formal sector. Participation in the informal market could be brought about for various reasons by both producers and consumers. For producers, milk traders offer better prices at the farm gate as they are paid cash immediately, unlike milk sold through cooperatives. On the other hand, consumers can purchase milk cheaper there than in the formal market, as it's easily accessible and available in variable quantities. Raw milk also has a higher butterfat content; thus, appealing to their preferences (Muriuki, 2011). Gelb, Mengistae, Ramachandran, and Shah (2009) suggest that if farmers are faced with the decision to formalise or stay informal, most producers would choose the informal sector in East Africa. This is because farm gate prices are 22% higher than the milk prices in the formal market (Karanja, 2003). In addition, the difference between prices is estimated to \$0.11 less per litre for milk producers selling to milk collectors, such as cooperatives, rather than producers who sell to cash-based traders (ILRI, 2008; Muriuki, 2011). To break even, a farmer needs six cows in the formal sector and five in the informal sector (Muriuki, 2011).

### **1.3 Milk outlets in Kenya**

The channels for marketing milk include the formal and informal supply chains. Milk sold in the formal chains involves milk transportation to chilling and bulking centres and finally, processing facilities where the milk undergoes pasteurization before being sold to

consumers. While milk in the informal chain does not undergo pasteurizing and is transported in its raw form to consumer (Knips, 2005; Muriuki, 2011). The steps involved in the supply chains largely demonstrates a characteristic of a supply chain indicative of a large number of actors that are likely to take part in the milk distribution system.

The fragmentation of the dairy supply chains means that consumers can purchase processed or unprocessed milk depending on the choice of outlets and type of milk sold at the outlet.

The consumers can therefore purchase milk through various channels; supermarkets, milk dispensers, farmers, small shops and milk bars (Knips, 2005; Muriuki, 2011).

#### **1.4 Significance of the study**

It is largely perceived that the relative risk of food-borne illness is higher for unprocessed milk. Consumers are driven to purchase raw milk because it is cheaper, readily available and well aligned to consumers' traditional tastes and preferences. However, empirical studies have shown that milk sold in both the formal and informal sectors may not meet microbial standards and thus both market segments may pose a hazard. This is evident in some areas in Kenya where milk adulteration is prevalent, especially in dry seasons where high milk prices acted as an incentive (Blackmore, Alonso, & Grace, 2015; Omore et al., 2005; Shitandi & Sternesjö, 2001).

Given the concerns around the consumption of milk in Kenya, there is a need for empirical research to determine factors affecting milk purchasing behaviour and choice of outlets. The informal sector accounts for 86% of the total volume of milk marketed and, therefore, understanding its organisation would be vital to understanding consumers' perspectives about milk purchases and, thereby, understanding what drives their demand for milk. Since the demand for milk is increasing with population growth in Kenya, the results of this study will help inform the debate by improving understanding of what drives consumers' choice.

This will provide useful insights into the likely impact and effectiveness of the Kenyan government's drive to further regulate the milk industry.

## **1.5 Study objectives**

This study seeks to identify the factors influencing the choice of fluid milk by consumers in Kenya, focusing specifically on the purchase of processed versus unprocessed milk. The main research question is:

What are the factors that affect the milk purchase in Kenya?

Through examining the main research question, the study aims to:

1. Identify the characteristics of the Kenyan dairy consumer
2. Determine consumers' perceptions about the various milk outlets
3. Identify the factors that affect consumers' demands for fluid milk in Kenya

By investigating the aforementioned, the study aims to make recommendations to inform policy concerning the development of the formal sector in Kenya.

## **1.6 Organisation of the thesis**

Chapter 1 outlines the context of the research, provides an overview of the study objectives and justifies the motivation for the research. Chapter 2 reviews the literature about the Kenyan dairy industry and lays the foundation for the conceptual framework. Chapter 3 describes the research method, while chapter 4 presents the descriptive statistics. Chapter 5 presents the results of the data analysis and, lastly, chapter 6 draws on the results to present an integrated discussion, recommendations and conclusions.

## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

This chapter presents a review of the literature on the Kenyan dairy sector. It particularly focuses on the structure and regulatory framework of the dairy sector. This is followed by a review of the relevant theory and presents empirical evidence that lays the foundation for the conceptual framework.

#### **2.2 Formal and informal sectors: definition and approaches**

The concept of 'formal' and 'informal' marketing channels is widely used to describe the dairy industry, especially in the context of a developing country. The description of the marketing channels is differentiated by the distribution of processed milk or the lack of it, in the dairy sector (Rademaker et al., 2016). Formal milk marketing channels refer to channels that move and process milk products to the final consumers, while informal channels only move raw milk. Therefore, neither the formal nor informal sector has proper legal recognition other than just a means to describe the movement of milk in the supply chain (Knips, 2005). Although this definition is rather simplistic, it paints a picture of the distribution channels present and lays a foundation in which milk outlets are categorised according to the type of milk sold.

In this section, the formal and informal channels will be discussed as they pertain to the Kenyan dairy sector. First, the background of the dairy sector is described and then the history of the different marketing channels is explained. The structure and regulatory framework of the sector for the formal and informal channels is also presented.

### **2.2.1 Background and overview of the Kenyan dairy industry**

The Kenyan dairy industry was liberalized in 1992 as part of the government's economic reforms. Prior to liberalization, the Kenya Cooperative Creameries (KCC), a state-controlled firm, handled milk processing and coordinated the collection and bulk transportation of milk through a network of cooperatives. The KCC also handled the payment system, a system that small-scale farmers found to be favourable. This era of state control saw the emergence and growth of cooperatives, under state directives, that became dependent on the state and other agencies. Cooperatives were used as tools to implement socio-economic policies by the government, leading to their use as a political tool resulting in policy failures expressed in the cooperative movement (Abdulai & Birachi, 2009; Leksmono, Young, Hooton, Muriuki, & Romney, 2006).

The post-liberalization era saw an increase in the number of processing firms and the entry of intermediaries, such as brokers, agents, milk bars, and itinerant traders, into the industry. Liberalization sought to create autonomous member-based cooperatives that were intended to be democratically and professionally managed, self-controlled and self-reliant business ventures (Abdulai & Birachi, 2009; Muriuki, 2011). Milk producers had to coordinate the production and market-related activities owing to the exit of state marketing agencies from the dairy sector. Producers were now forced to incur higher transaction costs in the form of search costs for marketing outlets, as well as the screening and monitoring of contractual agreements with individuals and firms (Leksmono et al., 2006; Valentinov, 2007; Wanyama, 2016).

The Kenyan dairy industry has since developed to be a highly fragmented sector consisting of multiple milk producers, intermediaries, processors, retailers and consumers (Rademaker et al., 2016). Owing to the fragmentation of the dairy supply chain, cooperatives have not been operating efficiently due to the availability of alternative marketing channels for farmers and

consumers. The dairy market is oligopolistic in nature and the dairy cooperatives lack bargaining power against the processors since milk sellers are essentially price-takers. The milk processors determine the price for the milk sold, with the prices offered to farmers being determined by seasonality. During seasons of high and low supply, there have been cases where large milk processors have cut the price of milk. This, in turn, has led to milk price fluctuations during periods of variation in supply, which has made consumers sensitive to milk prices. As a result, Kenyan consumers are likely to select marketing channels that are favourable to their needs (Olwande, Smale, Mathenge, Place, & Mithöfer, 2015).

### **2.2.2 Structure of the dairy sector in Kenya**

A review of past studies indicates that there is limited literature concerning strategic choices made by African firms, especially for smallholder producers and their performance (Jayne, Mather, & Mghenyi, 2010; Tvedten, Hansen, & Jeppesen, 2014). Gelb et al. (2009) suggest there exists minimal differences in small formal and informal firms in East Africa with both recording a similar level of productivity. They further explain that the performance could be brought about by weak service delivery and by the failure to enforce formalization of the industry. The tendency to generalise business performance in Africa without specific considerations given to country, industry, sector and strategy dynamics, fails to consider why businesses in similar circumstances adopt different strategies and record different performances (H. Muriuki et al., 2003; Tvedten et al., 2014). While successful business performance is pegged on transitioning from the informal to the formal sector, there is evidence to suggest that the informal sector plays an equal role in Africa's growth as the formal sector. Gelb et al. (2009) compared small formal and informal firms in East and South Africa and noted that the informal sectors provided opportunities for growth and employment creation. The dominance of the informal sector in Kenya is mirrored by her neighbouring countries, Uganda and Tanzania, as well as other developing countries in



different regions. India for example, dominates the world in dairy production with 85% of its milk sold in the informal sector (BIRTHAL et al., 2017). Kenya, however, stands out with an economic gain recorded after the brief legalisation of the informal sector (KAITIBIE et al., 2010).

### **2.2.3 Regulatory framework in the dairy sector in Kenya**

Kenya's dairy regulatory framework has changed over time. Prior to 2007, milk sales in the informal sector were banned, with raw milk sellers reporting cases of harassment from officials seeking rent (Baiya & Kithinji, 2010; Leksmono et al., 2006). The competition brought about by the informal sector led to a 'milk war', in 2003, as the formal sector sought to portray the informal sector in a negative light in the public eye, although the efforts were unsuccessful (Leksmono et al., 2006). Milk sales in the informal sector were legalised over time (between the periods 2007 to 2016). It was also in this period that the use of milk dispensers increased. Milk traders were then licensed and required to pay KDB a cess fee of \$0.002 per litre of milk on behalf of the milk producers (Kaitibie et al., 2010).

As a result of extensive research undertaken by organisations like the International Livestock Research Institute (ILRI) and the Smallholder Dairy Project (SDP) with vested interests in the dairy sector, small-scale milk vendors (SSMV) in the informal sector have undergone training and certification in an attempt to safeguard public health concerns and address quality concerns rather than stamping it out (Baiya & Kithinji, 2010; Leksmono et al., 2006).

Further, through use of the Dairy Traders Association (DTA), milk adulteration was greatly reduced due to the enforcement of a code of conduct and the failure to abide by the rules and regulations leading to fines being imposed. There has been a marked economic improvement in the performance of smallholder dairy farmers and vendors as a result of evidence presented by the two key studies made by Kaitibie et al. (2010) and Leksmono et al. (2006), who advocated for the importance of the informal sector.

#### **2.2.4 Milk processing and handling in Kenya**

Milk processing and handling have long been a contentious issue in both the formal and informal sectors. Milk processing and handling affects the production and consumption of the milk produced and, thus, affects the industry's ability to meet demand and compete in the regional market. Currently, there are four main processors: the Brookside, New KCC, Sameer, and Githunguri dairies which, together, handle 85% of the milk produced in the formal sector. Milk from these processors is largely perceived as safe since it is sold through the formal chain in comparison to milk marketed through the informal chain (Bolo, Lorika, & Obonyo, 2011; Fischer & Qaim, 2012).

The importance of milk handling has affected the growth of Kenya's dairy industry. This is evident in the seasonality in milk production and the milk quality issues frequently reported in the media (Gelb et al., 2009; Omore et al., 2005). While the formal chain is perceived to be safer, there is a need to understand the safety issues reported pertaining to consumption and how this affects demand in both the formal and informal chains. To this end, several studies have been conducted on the issues surrounding milk handling.

Walke et al. (2014) report that the aflatoxin content is lower in processed milk, and this could be attributed to the heat treatment that the milk undergoes during processing. The informal chain is seen to experience milk quality issues, including aflatoxins, preservatives and drug residues, high levels of hazardous bacteria, as well as milk adulteration. The Kenya Dairy Board (2015) found that antibiotic drug residues were present in equal amounts in both processed and raw milk, suggesting that there are issues relating to how milk is produced and handled at the farm gate level. Processors have also been found to use illegal preservatives, such as hydrogen peroxide (Tuei, 2010). In addition, bacteria are thought to be introduced via the plastic jerry cans used by the milk producers and traders, since such vessels are difficult to clean. Reports of this behaviour have been made to the Kenya Bureau of Standards (KEBS),

where both raw and processed products have shown almost similar levels of bacteria (Kenya Dairy Board (2015)).

Lanyasunya, Wamae, Musa, Olowofeso, and Lokwaleput (2005) provided some empirical evidence about the Kenya Dairy Board (2015) findings, that there were high risks of mycotoxin-related livestock and human poisonings because of the growth of aflatoxin-producing moulds. Humans are exposed to aflatoxins through the consumption of milk from cows that have consumed contaminated feed or fodder (Lanyasunya et al., 2005; Lizárraga-Paulín, Moreno-Martínez, & Miranda-Castro, 2011)). Similarly, Omore et al. (2005) found that milk sold in the Kenyan market carries a considerable risk regardless of the source.

While these studies show considerable milk quality issues in the dairy sector, there are also issues specific to milk production at the farm level that affect its production. Fluctuations in milk production according to the season, inconsistency feed quantity and quality, including inadequate use of industrial cattle feeds, and the lack of good quality animal husbandry and farming practices, are all reported to affect how milk is produced and supplied. In addition, reduced access to breeding, animal health, credit services and the high cost of artificial insemination (AI) service are found to hinder farmers' efforts in milk production (Omore et al., 2005). It is suggested by Baiya and Kithinji (2010) that restrictions be put in place to control and monitor animal feed.

### **2.3 Relevant theories for understanding consumer behaviour**

Consumer behaviour has long been a vital field of study. Knowledge of factors that influence consumers' decisions to make purchases is essential for decision-making in every industry.

Several models have been used to explain the motivations behind consumers' decision making. These include; the theory of planned behaviour, the theory of reasoned action, the random utility theory and the discrete choice theory, among others. They explain the factors

that would influence an individual's behaviour concerning purchase. This section discusses some of the models with an emphasis on the most commonly used model; the theory of reasoned action and discrete choice theory, the models of choice for this study.

### **2.3.1 Theory of planned behaviour**

The theory of planned behaviour (TPB) is used to predict human behaviour in certain contexts. TPB has been applied to many consumer and health behaviour studies. It is an extension of the theory of reasoned action, which was brought about by the limitations of the original model in dealing with behaviours where individuals have incomplete volitional control (Ajzen & Fishbein, 1969). The theory is centralised on the individual's intention to perform a given behaviour. The assumption guiding the theory is that behaviour is influenced by motivational factors, which are indicators of: (1) how hard people are willing to try; and (2) how much effort they are willing to apply in order to perform the behaviour. The general rule is; the stronger the intention, the more likely the performance. However, the behavioural intention can only express itself in behaviour, if the behaviour is under volitional control (Ajzen, 1991; Eagly & Chaiken, 1993).

TPB operates under the assumption that motivational influences on behaviour are captured by behavioural intentions. The behavioural intentions are seen as a function of attitude, subjective norms and the perceived behavioural control related to the specific behaviour.

The behaviour is determined by the resources available to an individual, and argues that if the resources are adequate, the individual is most likely to succeed. (Ajzen, 1991). Arvola et al. (2008) have discussed the motivation and ability of behavioural achievement.

The attitude towards an act or behaviour is the first construct that examines an individual's belief about whether a certain behaviour makes a worthwhile contribution. Subjective norms focus on the individual's environment. They examines how social networks, group beliefs, etc.

influence the individual (Harré, 1986). Perceived behavioural control focuses on a person's belief about the ease of displaying a certain behaviour or acting in a certain way. The theory argues that an individual's attitude towards certain acts or behaviour, within favourable social norms at a level of perceived behavioural control, in turn, influences the individual's behaviour or act (Ajzen, 1991; Arvola et al., 2008).

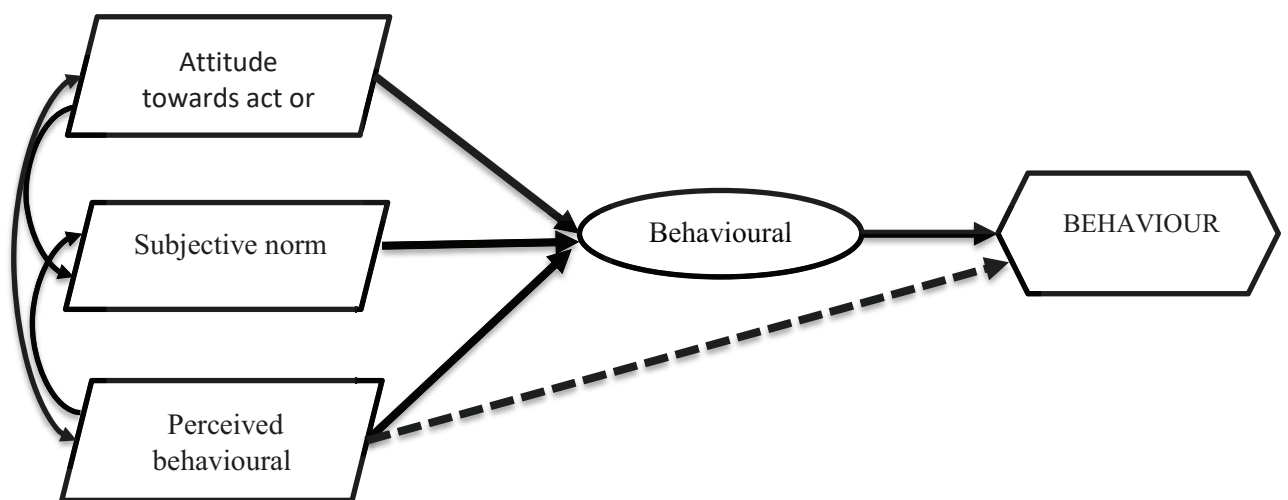


Figure 1: Theory of planned behaviour

### 2.3.2 Random utility theory

The random utility theory is used to explain the inconsistencies observed in choice experiments where when an individual is presented with repeated alternatives of a particular subset, the subject chooses a different alternative each time (Azari, Parks, & Xia, 2012).

Utility refers to the ability of an individual to make a choice based on preference. In most cases, the distributions of the random variables are limited to a parametric family and the problem is addressed in the utility. Random utility models are considered a subset of probabilistic choice models that attempt to describe inconsistencies observed in patterns of individual behaviour (Manski, 1977).

Economists, such as McFadden (1973), accepted the model as an economic representation of maximizing behaviour. Utilities are regarded as random variables that reflect the lack of information regarding the characteristics of the alternatives and the decision-makers on the part of the observer. They do not reflect any lack of rationality in the decision-maker.

Classical choice theory explains individual behaviour as a two-step recursive process. Exogenous forces pose a choice problem; on an individual and the choices available. The individual then selects a choice among the alternatives present. Random utility focuses on classifying the categories of decision rules and is centralised on the mechanism generating the choice problems (Manski, 1977).

The first step is to assume a decision rule that maximizes utility, describes a choice set structure and the finite point set. The theory models an individual's preference for set alternatives by setting a score on each alternative from the parametrised distribution, followed by ranking the alternatives according to the scores (Azari et al., 2012).

### **2.3.3 Theory of reasoned action approach**

The theory of reasoned action approach (RAA) is used widely in behavioural studies, including consumer behaviour studies (Ajzen & Fishbein, 2005; Fishbein & Ajzen, 2011). RAA was born out of the limitations experienced in the TPB and TRA. This theory's strength lies in its ability to explain the link between verbal attitude and actual behaviour, because, according to Ajzen and Fishbein (2005), attitudes predict and explain behaviour. The theory suggests that performance of a particular behaviour is determined by the attitude towards the behaviour, either favourable or unfavourable, and society's expectation about its performance relative to the intention, which is the direct precursor of the said behaviour.

RAA follows the assumption that an individual's social conduct (attitudes, norms, and intentions) flows reasonably from the information or beliefs people have over the specific behaviour under question. The beliefs may be from a variety of sources, e.g., print media,

personal experience or interactions with family and friends that are thought to follow rationally from one's belief as adapted from their environment. Consequently, beliefs differ depending on social background and peoples' personalities. The beliefs also serve to guide decisions on whether to engage in a behaviour regardless of how it is acquired. Fishbein and Ajzen (2011) distinguish between three beliefs according to the individual, the people around them and the environment that dictates their behaviour.

Individuals will hold a belief about the consequences anticipated should they perform the behaviour. This is assumed to determine the individual's attitude towards performing the behaviour. If the expectation of behavioural performance is positive, the attitude toward the behaviour will be favourable. Second, people's beliefs are also guided by people around them that they deem important, who would approve or disapprove of their performing the behaviour, as well as the beliefs of the referents themselves who choose to engage or not engage in the said behaviour. These normative beliefs produce societal pressure to determine whether to engage in the behaviour or not. Finally, people form beliefs about personal and environmental factors that determine their efforts in carrying out the behaviour. Together, these control beliefs result in efficacy, which can be either low or high (Bandura, 1984, 1986). This is also seen with perceived behavioural control regarding behaviour (Fishbein & Ajzen, 2011).

RAA, however, can account for the intention variance by 50-60% and 30-40% of the variance in behaviour; thus, limiting its predictive validity (Gold, 2011).

#### **2.3.4 Discrete choice theory**

Discrete choice theory is an extension of the utility maximization framework used for the purposes of describing and explaining choices between distinct alternatives. It is used in behavioural studies to determine between choice sets that are mutually exclusive and

exhaustive (Anas, 1983). The models relate a choice to the attributes of the individual making the choice as well as the attributes of the choices in question.

The decision-makers are assumed to make selections based on the option that will yield the highest utility or satisfaction available. While the individual's utility cannot be observed.

The choice and the attributes of the choice set and the decision-maker can be observed. The empirical estimation of theoretical choice models is achieved by the specification of a probabilistic function vis-a-vis the choice outcome and the observable factors (Anas, 1983; Cheremukhin, Popova, & Tutino, 2015). Behaviour concerning choice is driven by differences in utility rather than absolute values since the latter are considered irrelevant.

This theory helps in developing an empirical model in the study and is used to describe the underlying variables. The choice set in this study includes outlets selling processed milk and other outlets selling unprocessed milk. RAA informs the variables in the study. The following section presents studies on consumer behaviour about milk purchases and forms the basis for the conceptual framework.

## **2.4 Empirical evidence on factors that would influence the demand and consumption of fluid milk**

The theories outlined in this study explain the factors that influence consumer's behaviour when purchasing a product. This section reveals that studies on the demand and consumption of milk have shown that a combination of socioeconomic, demographic, institutional variables and the perception of various variables, determine the choice of marketing channel. Therefore, this sub-section focuses on reviewing the relevant studies on milk consumption both within and outside Kenya that can be used as a foundation to construct the conceptual model for this study. The following discusses some results from previous studies.



### **2.4.1 Socio-economic and demographic factors**

Nguyen et al. (2013) found out that socio-economic and demographic factors and level of knowledge influenced the expenditure on dairy products in Vietnamese households. Accordingly, dairy expenditure differed between urban and rural households with the potential of an increase in household income, higher educational level and the presence of children in the household, to positively affect consumption.

The literature shows that gender and young children in a family have a significant effect on milk purchasing decisions (Nguyen et al., 2013; Shahzadi, Yaseen, & Mubeen, 2017; Trung et al., 2014). Female-headed households were found to be significant in affecting households' expenditure and were more conscious of health (Radam, Yacob, Bee, & Selamat, 2010). The age of children also mattered when it came to health consciousness, with households being more concerned about the safety of milk rather than the price. In addition, the income and educational level in a family positively influenced expenditure on milk. De Alwis, Edirisinghe, and Athauda (2011) established that consumers with higher monthly incomes and levels of education were more likely to purchase milk products and also consume dairy products (Onurlubaş & Yılmaz, 2013).

### **2.4.2 Health and safety**

Previous studies conducted by (Grunert, 2005) suggest that consumers are increasingly concerned about the quality, safety and nutritional contents of their food. Consequently, the health benefits, how the food is manufactured, its convenience and packaging, affect food consumption.

In addition, consumer awareness about health implications has been found to affect a household's consumption of dairy products. Boniface and Umberger (2012) and McGill et al. (2008) stipulated that consumers with a positive perception of the benefits of dairy lean towards a higher consumption of these products. Consequently, Grunert, Bech-Larsen, and

Bredahl (2000) emphasized the need for processors and marketing agencies to understand consumers' perceptions of quality. Further, the study explained the four dimensions that characterize perceptions of the dairy products; hedonic (sensory attributes such as taste or smell), convenience related (distance to buy the product, e.g. house to the shops), process-related (production processes such as animal welfare) and health related activities, and advocated that the four concepts form the basis for understanding consumers' behaviour.

### **2.4.3 Price sensitivity**

Studies reveal that the preference for unpacked<sup>1</sup> milk is related to price and the ease of availability in comparison to packed milk, which can only be accessed in supermarkets or well-established shops. The presence of milk traders eases the burden on consumers because the milk is brought to their residences. This type of organization enabled the milk traders to sell milk at lower prices since they avoided tax and packaging costs (Hatirli, Ozkan, & Aktas, 2004).

### **2.4.4 Forms of packaging**

There has been an increase in the number of private players in the dairy sector, indicating that the demand for dairy products has gone up and, consequently, the choices available to consumers have increased. As mentioned previously, raw milk comprises the larger share of the market, with fewer consumers, who mostly live in the urban areas, opting for packaged milk. Studies have shown that the demand for milk could be influenced by various social, economic, cultural, customer attitudes and demographic characteristics (Adede & Kinoti, 2016; De Alwis et al., 2011; Onurlubaş & Yılmaz, 2013). Kuma, Baker, Getnet, and Kassa (2012) found that gender, age, and the educational level of the head of the household, the age of children and size of the family and household income affected the decisions of individuals to consume either packed or unpacked milk (Shahzadi et al., 2017).

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<sup>1</sup> Unpacked means milk that has not been packaged and can be categorised as milk in sold in the informal sector

Meanwhile, the main reason consumers would prefer packaged milk is the assurance of safety, quality and for a healthy food product. The desire for packaged milk is also influenced by demographic factors such as the number of children in a household, income, level of education and age of household head. Specifically, households with children under the age of five are concerned with the quality of milk (Akabay & Tiriyaki, 2008).

#### **2.4.5 Type of channel**

Consumption of milk is also influenced by the distribution channels that milk marketers' use in reference to raw versus processed milk, with the availability of delivery points and home delivery influencing the amount of the purchase (Adede & Kinoti, 2016).

Other studies undertaken on the type of food markets indicate that consumers are likely to select a marketing channel based on their level of income and education. A study carried out in Malaysia found that socio-demographic variables, such as age, education and family size as well as packaging, store environment, and price of products, have an influence on retail choice of format for the type of food retail outlet a consumer was likely to choose (Terano, binti Yahya, Mohamed, & bin Saimin, 2015).

#### **2.4.6 Distance to market**

A study on vegetables in Kenya on the preference for purchasing from greengrocers or open-air markets revealed that the location of consumers played a major role in determining their choice of markets. Rural living consumers preferred open-air markets while urban households preferred greengrocers. Moreover, age, gender, size of household, distance to markets and perceptions about retail prices determined the choice of outlets a household preferred (Gido, Ayuya, Owuor, & Bokelmann, 2016).

Similarly, a study in Ghana on consumers' food shopping choices found that high income and well-educated households are likely to purchase from supermarkets since they have a wide variety of food products and so are convenient for them. They also perceived that food

items bought from supermarkets were more hygienic, offered nutritious products, had access to a variety of imported foods, all of which were considered safe to consume. In addition, consumers with lower incomes and from less educated households preferred open-air markets because of the variety they offered; the products sold were cheaper and it was convenient to purchase food items from the open- air markets (Meng, Florkowski, Sarpong, Chinnan, & Resurreccion, 2014).

#### 2.4.7 Issues specific to countries

A study undertaken in Australia revealed that consumers perceived whole milk to be of lower quality than other types of milk (Bus & Worsley, 2003). Moreover, the elderly and women had a preference for reduced-fat milk to milk with a higher fat content. A similar study conducted in the US found that low-fat milk consumption was influenced by income, age, and educational level (Robb, Reynolds, & Abdel-Ghany, 2007). In Taiwan, liquid milk was purchased more by consumers with higher levels of income (Lu Hsu & Lin, 2006; Robb et al., 2007). In Turkey, it was found that milk distribution choice was determined by the number of children in a household and educational level (Boniface & Umberger, 2012; Hatirli et al., 2004). Table 1 provides a summary of empirical findings of the studies discussed above, the analysis used in the study and their findings.

Table 1: Summary of empirical findings

Author	Model	Findings
<b>(Shahzadi et al., 2017)</b>	Multinomial logit	Results showed that an increase in income increased the likelihood of people purchasing packaged milk.
<b>(Rahnama &amp; Rajabpour, 2017)</b>	Structural equation modelling, chi square, confirmatory factor analysis	Results showed that emotional, functional, social and epistemic values had a strong influence on consumers' choice behaviour towards dairy foods while the conditional value did not have an impact.

<b>(Adede &amp; Kinoti, 2016)</b>	Factor analysis	Results indicated that brand-specific factors played a significant role in determining brand choice while personal factors had the least influence
<b>(Kuma et al., 2012)</b>	Multinomial logit model	The results indicated that a higher educational level led consumers to be more safety conscious and favour packed milk; however, an increase in income did not really affect the choice as consumers could still buy both.
<b>(Kilic, Akbay, &amp; Tiryaki, 2009)</b>	Multinomial logit model	Young female-headed households, with better incomes and higher educational levels preferred packaged milk. Also, people who felt that packaged milk was more expensive were more likely to consume unpackaged milk. They also found out that attitudes, beliefs and behaviour influenced people while making milk choices.
<b>(Gulseven &amp; Wohlgenant, 2017)</b>	Two- stage estimation technique	The study concluded that factors, such as health concerns due to racial background, are the motivation for the consumption of organic or soy milk.
<b>(Bal &amp; Gulse, 2013)</b>	Binomial logit model	The findings revealed that consumption of organic milk was influenced by the socio-economic and demographic characteristics of the households. The presence of an educated and working wife had a positive effect on the demand of organic milk.

## 2.5 Research gap and relevance of study

Developing countries have increased the use of informal milk marketing channels as a consequence of their fragmented dairy supply chains. Countries like India, Kenya, Tanzania, and Ethiopia have reported high levels of use of the informal milk marketing channels. As a result, there are concerns about food safety, especially brought about by improper milk handling strategies.

The FAO has raised the importance of formalizing the dairy industry in order to improve food security and overall health, especially in the least developed countries. Encouraging the growth of the formal dairy industry is one way of doing this. Arguably, the use of milk dispensers would encourage the growth of the formal sector in developing countries. The uptake of the dispensers in Kenya has led the Kenya Dairy Board to produce rules and regulations to enforce globally-accepted standards to improve the sector with the hope of

exporting the product. The literature lays out the factors that could influence consumer behaviour in product choices but there is limited information about milk dispensers and how they affect the dairy sector. Further, there are no clear studies on how to encourage the growth of the formal sector especially in the context of developing countries where the informal sector is common. This study aims to fill this gap in the literature by addressing the objectives of the study.

## **2.6 Conceptual framework**

The conceptual framework developed here explains graphically the determinants of consumers' choice of milk marketing channel in this section. It explains how various factors influence the probability of the use of a particular marketing channel. The framework starts with the identification of the driving factors for the adoption of milk marketing channel. These can be grouped into socio-economic, demographic, health and safety, price, forms of packaging and institutional factors and the milk marketing channels categorised into the formal and informal sectors, available to a consumer.

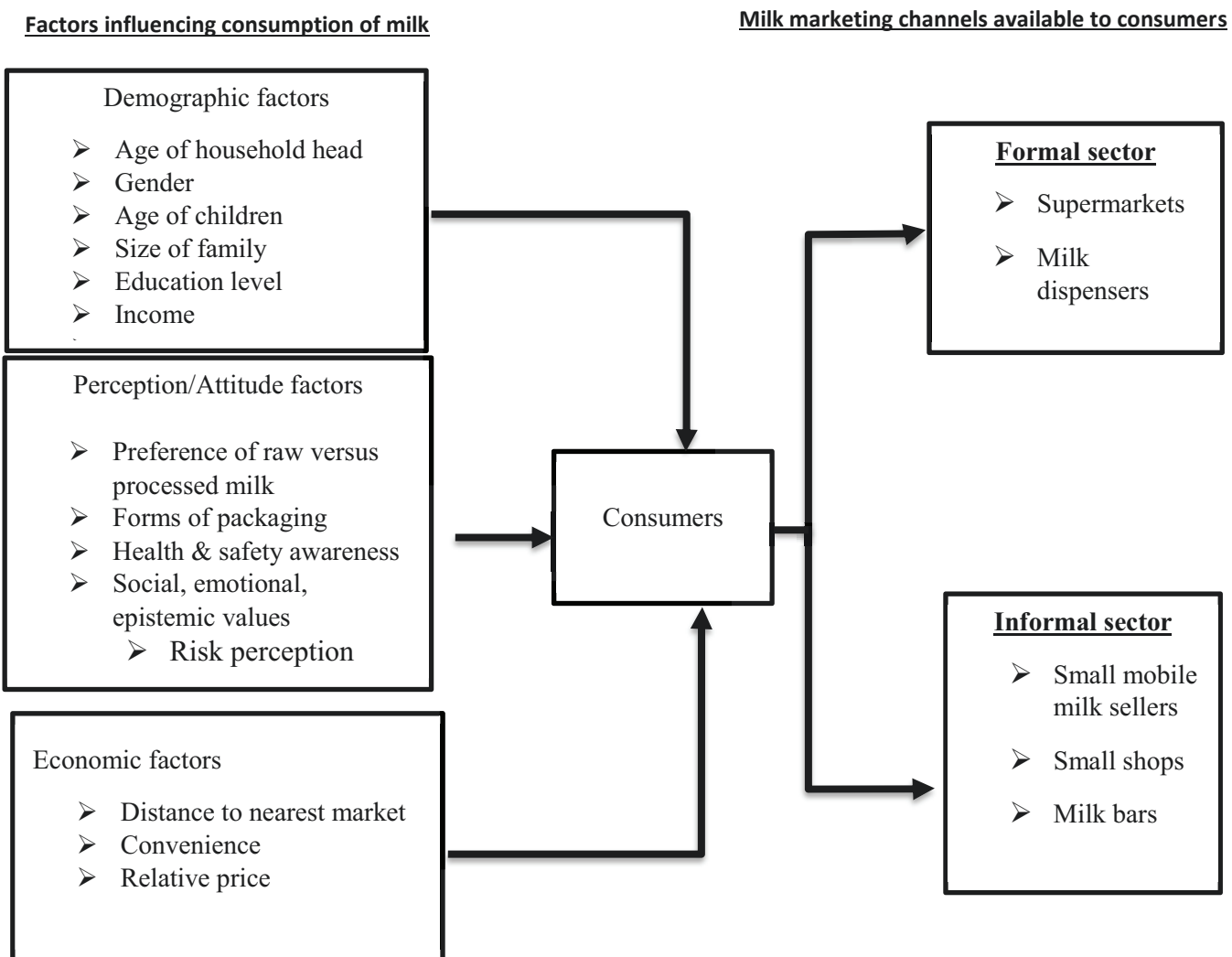


Figure 2: Conceptual framework of the study

Source: Author's compilation

## **Chapter 3**

### **Data collection**

This chapter describes the research methods employed in this study to collect data and test the propositions used to identify the factors that would influence consumers' choice of specific milk outlets. The chapter is separated into sections that highlight the strategies used to carry out the study. It explains how the data was collected and offers an overview of the research site and the respondents' characteristics.

#### **3.1 Study area**

The study was conducted in two counties; Uasin Gishu and Nairobi. The counties were chosen because they were both urban areas but consumers in Uasin Gishu county were more likely to purchase milk from farmers and so the research aimed to capture the wider reasons for their choice of milk outlet. A total of 539 interviews were conducted in the two counties. All the respondents provided written consent to participate in the study after reading and acknowledging the research information sheet provided.

The two counties represent different socioeconomic and demographic regions in Kenya. Nairobi County is in the south-eastern part of Kenya and has a warm and temperate climate with an average annual precipitation of 869 mm. It is largely metropolitan with the largest proportion of urban dwellers in Kenya and has a population of 3.5 million people.

Uasin Gishu County is the breadbasket of Kenya and enjoys a favourable climate suitable for agricultural production. It is on the plateau of the mid-western Kenya Rift Valley Province. Eldoret town is the capital city of Uasin Gishu County and has a population of about 830, 000 people. The average precipitation is between 1100 and 1500 mm annually with a mean annual temperature of 23°C. Farming is the main economic activity in Uasin Gishu with farmers involved in dairy and crop farming. Uasin Gishu County was chosen because dairy production



is an important contributor to the economy and the fact that milk dispensers were first rolled out here. Figure 3, below, shows the location of the study areas.

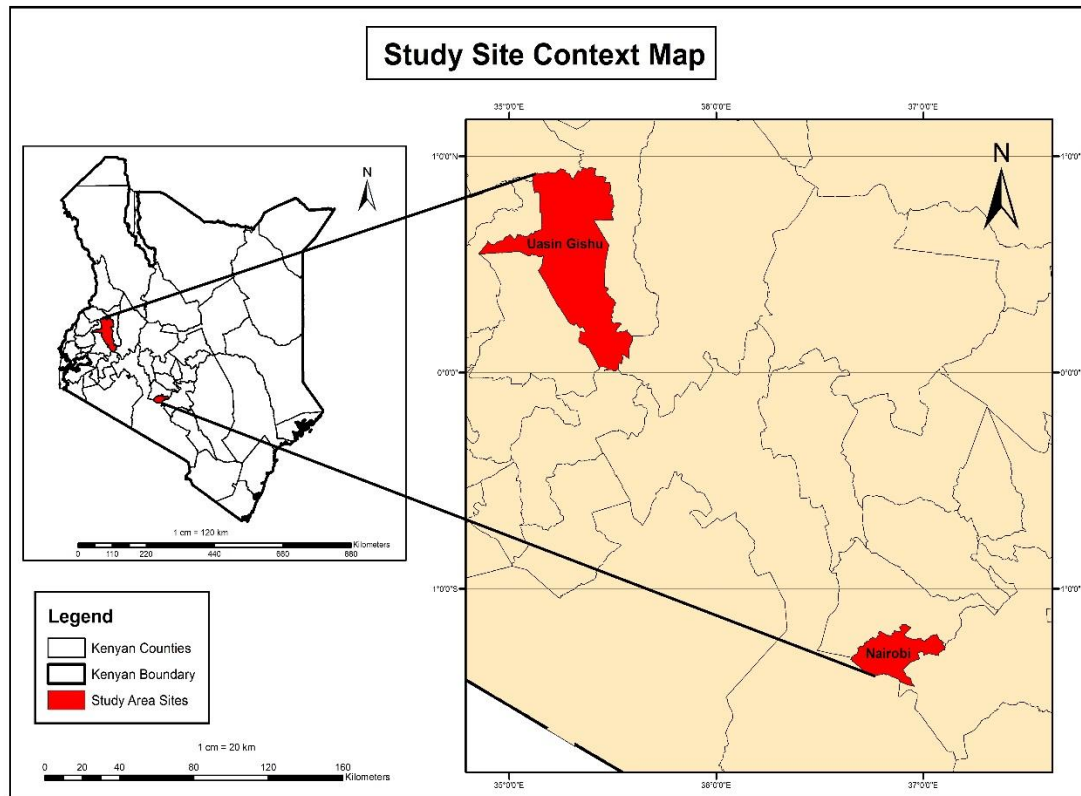


Figure 3: Showing the study areas of Uasin Gishu and Nairobi Counties

### 3.2 Survey design

The research was carried out using convenience sampling. Convenience sampling is a non-probability sampling technique frequently used in quantitative studies and is appropriate for studies with the intention to determine the extent of a phenomenon. The primary emphasis is on selecting participants who are readily accessible and, as the sample size increases, so does the statistical power (Etikan, Musa, & Alkassim, 2016).

In this study, respondents were approached at their points of purchase and the information collected provided the data required to confirm or refute the propositions presented in chapter two and to gain an understanding of the consumer's characteristics, their preferences, and factors that influenced their purchases from milk outlets.

### **3.2.1 Survey preparation**

#### **3.2.1.1 Human ethics considerations**

The primary data were collected in a professional manner with the full approval of the respondents. They were advised that participation was voluntary and their names would remain undisclosed in the thesis. The researcher obtained the signed forms from the respondents as proof of consent.

#### **3.2.1.2 Survey instrument**

A semi-structured questionnaire was prepared by the researcher with guidance from her academic supervisors. A copy of the questionnaire is included in the appendix. The questionnaire was coded into Qualtrics, a survey software that is operational on mobile phones and tablets. In the field, the interviews were conducted using the Qualtrics software and these were complemented by hard copy questionnaires in areas where accessing mobile data proved to be a challenge. Later, the filled out hard copy questionnaires were input into the software.

#### **3.2.2.3 Data and data collection method**

The data were collected with the assistance of five enumerators. The first week involved training the enumerators with the use of Qualtrics, pre-testing the questionnaires and restructuring the questionnaire to fit the study. After training, the enumerators were supervised by the researcher while they conducted the study. The researcher rotated among the enumerators to ensure the human ethics protocol was observed.

To improve the construct validity of the research, the author collected primary data from various places in the study area. The data were collected over a six-week period, between June and August 2019, and included comments from interviewees during the interviews. Respondents were randomly approached at the point of purchase at supermarkets, milk dispensers, mobile milk traders and small shops and dairies. They were randomly selected to

ensure variation in their characteristics such as age, gender and education, and this was also based on their willingness and ability to provide relevant information.

A total of 539 interviews were conducted in the two counties. All the respondents provided written consent to participate after reading and acknowledging the research information sheet provided. For further understanding of the context of data collection, Figure 4 shows a typical consumer purchasing milk from a milk dispenser (ATM) and Figure 5 shows a closer image of what a milk dispenser looks like.



Figure 4: Picture showing a milk ATM



Figure 5: Closer image of a milk dispenser

### **3.4 Data analysis method**

Data analysis was conducted using SPSS and Stata for the quantitative data, and Nvivo for the qualitative data. The questionnaire contained 32 questions covering a range of topics, and also included four questions that captured qualitative responses in the form of comments. The dependent variable was obtained by the choice of outlet indicating the preference of milk between processed and unprocessed milk, and thus, was dichotomous.

#### **3.4.1 Statistics used in the analysis**

Univariate analysis was employed to provide a description of the Kenyan consumers and their characteristics. Explorative analysis was also used to determine the relationships between the variables and provide a better understanding of the choice of outlets alongside the demographic variables. To understand consumers' perceptions of the outlets, bivariate analysis was used. Finally, to understand the factors that affected consumers' demands for fluid milk, a logistic regression of the data was employed.

# Chapter 4

## Descriptive Statistics

### 4.1 Introduction

This chapter provides descriptive statistics of the sample used in the study. It is directed by two research questions; what are the characteristics of the Kenyan consumer? And, how do consumers perceive the various milk outlets? The demographic data is presented first and briefly discussed. The second section presents the data on milk marketing channels present in the Kenyan dairy sector and provides results on the sources of information as well as the primary choice of milk outlet. The third section presents the attitudes and perceptions of consumers towards purchasing milk and the present milk outlets. This chapter provides insights into consumers' purchase behaviour in Uasin Gishu and Nairobi counties and provides the context for the discussion later in the chapter.

### 4.2 Univariate analysis

#### 4.2.1 Milk consumers' characteristics

##### 4.2.1.1 Gender, age, and education

Of the 532 consumers interviewed, the majority were male while Uasin Gishu County reported higher numbers of male respondents in comparison to Nairobi, at 55%.

Interestingly, Nairobi and Uasin Gishu Counties both reported almost similar numbers of female respondents (see Table 4 below).

Table 2: Gender of respondents

		Male	Female	
Name of the county you live in?	Uasin Gishu	129	105	234
	Nairobi	113	102	215
	Other	49	34	83
Total		291	241	532

The largest number of respondents in both counties were in the age category of 25-34, with respondents in Nairobi leading with 42% of the total respondents in that age category. This was closely followed by respondents in the 19-24 age category (see Figure 6, below).

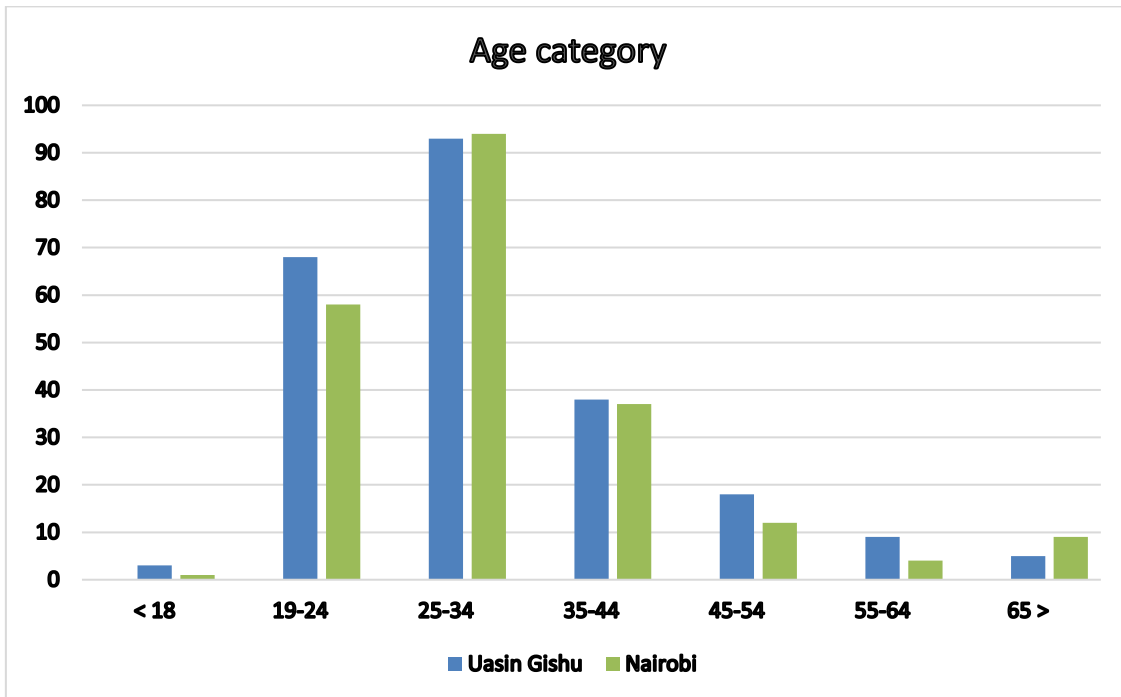


Figure 6: Age of consumers

For respondents in both counties the largest category held a bachelor’s degree as their highest level of education, at 37% and 35% in the Nairobi and Uasin Gishu Counties, respectively. Respondents from polytechnics came second at 35% in Uasin Gishu county while, in Nairobi, respondents who graduated from high school totalled 21% of the total respondents (see Figure 7 below).

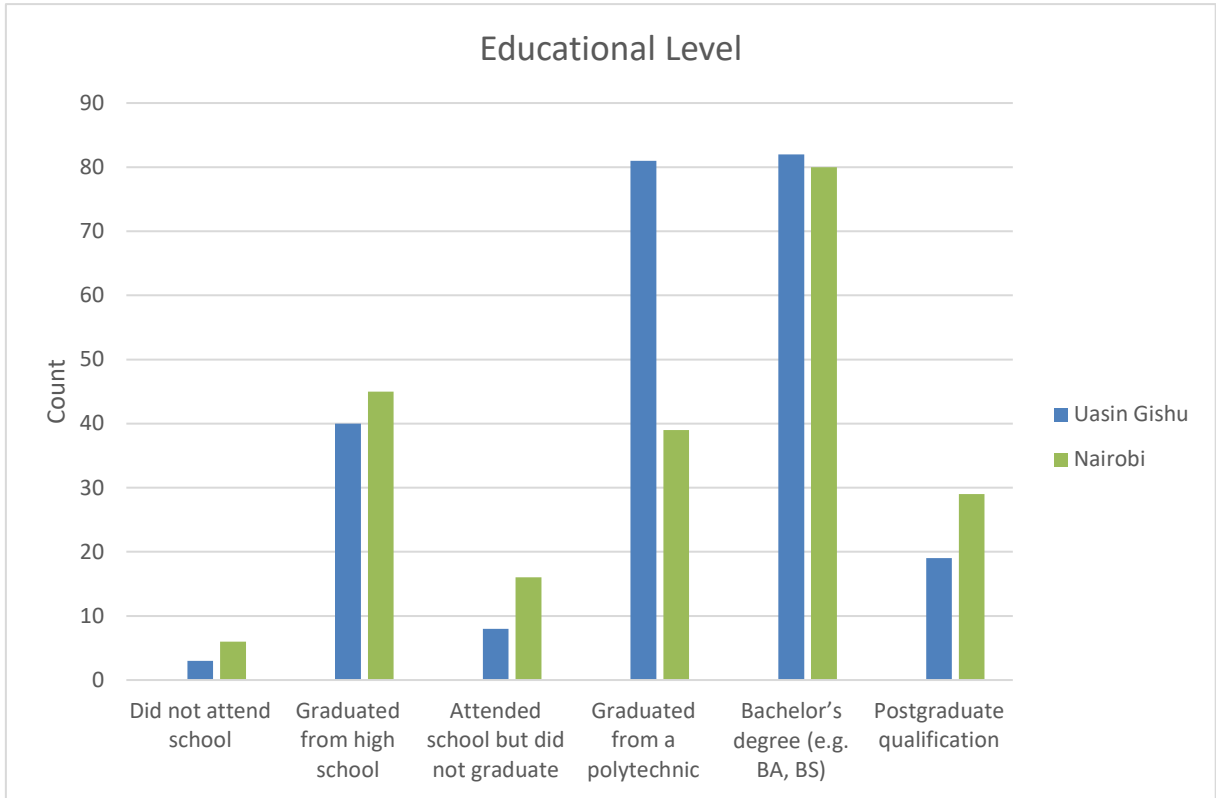


Figure 7: Educational level of consumers

#### 4.2.2.2 Monthly income

Respondents in both counties chose the category of 'Under KES 40,000', with Nairobi leading at 38% and Uasin Gishu at 36%. This category was closely followed by respondents who preferred not to disclose their income, 25% in Nairobi and 42% in Uasin Gishu (see Table 5 below).

Table 3: Respondents' monthly income

Monthly income	Nairobi (N=215)	Uasin Gishu (N=231)
Under KES 40,000	81	84
Between KES 40,001 and KES 80,000	29	29
Between KES 80,001 and KES 120,000	23	16
Between KES 120,001 and KES 160,000	14	3
Between KES 160,001 and KES 200,000	5	3
Between KES 200,001 and KES 240,000	2	0

Over KES 240,000	8	0
I prefer not to answer	53	98

#### 4.2.2.3 Household head

When it came to the gender of the household head, a larger proportion of males reported being heads of the household in both counties, accounting for 81% and 79% in Uasin Gishu and Nairobi Counties, respectively (see Figure 8 below).

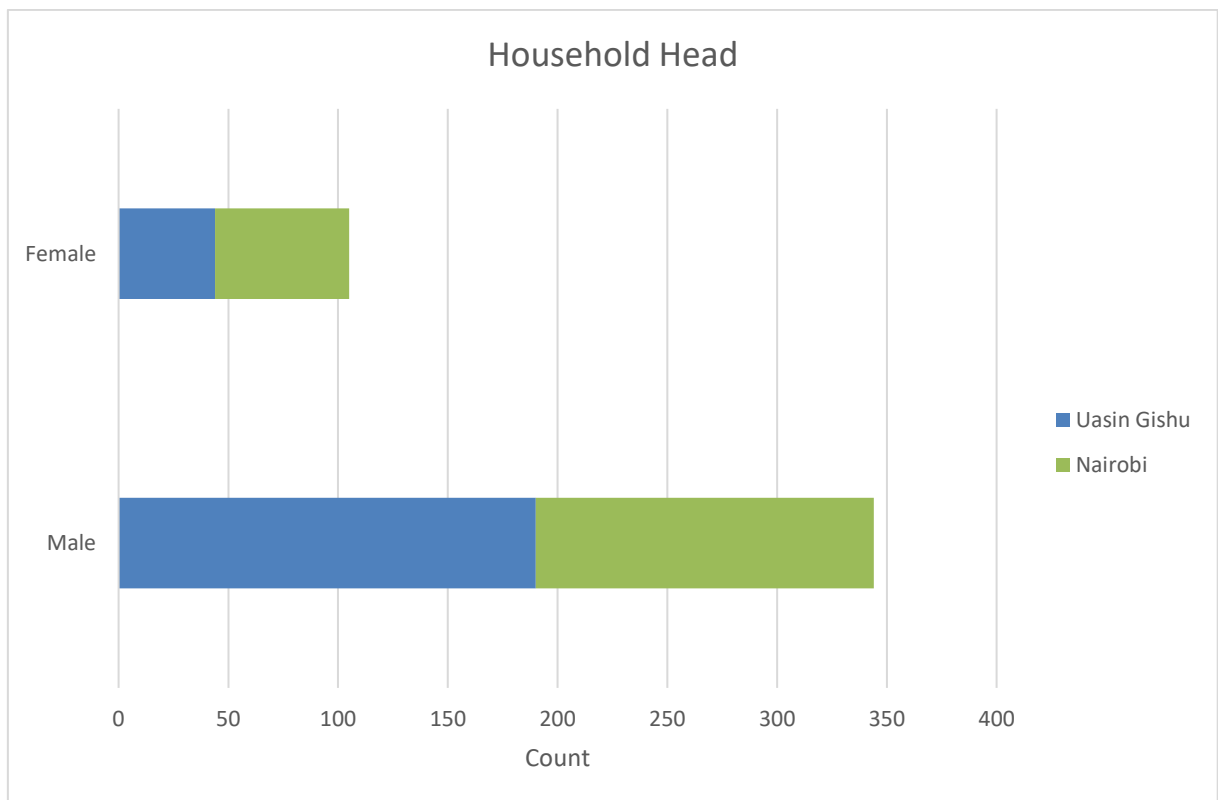


Figure 8: Gender of household lead

#### 4.2.2.4 Marital status

The largest number of respondents in both counties reported having never been married; these totalled 50% of the total respondents in both counties. This group was closely followed by respondents in the married category, at 42% of the total respondents in the counties (see Figure 9, below).



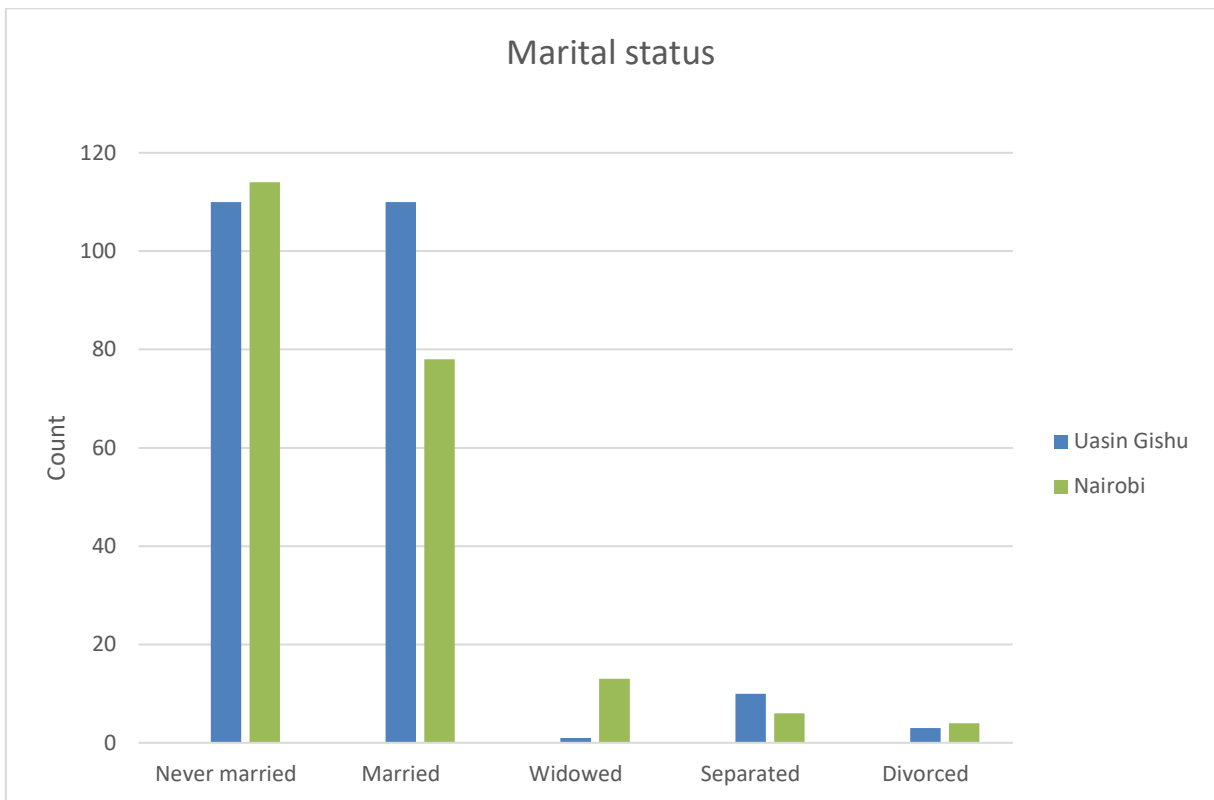


Figure 9: Marital status of respondents

#### 4.2.2.5 Children under five

Of the respondents who indicated they have children, Uasin Gishu County had a higher number of families with children under five years totalling to 98 with Nairobi reporting 80.

The figure below shows the proportion of children according to age. Uasin Gishu County recorded more children under one while Nairobi had more children between one and two years (see Figure 10 below).

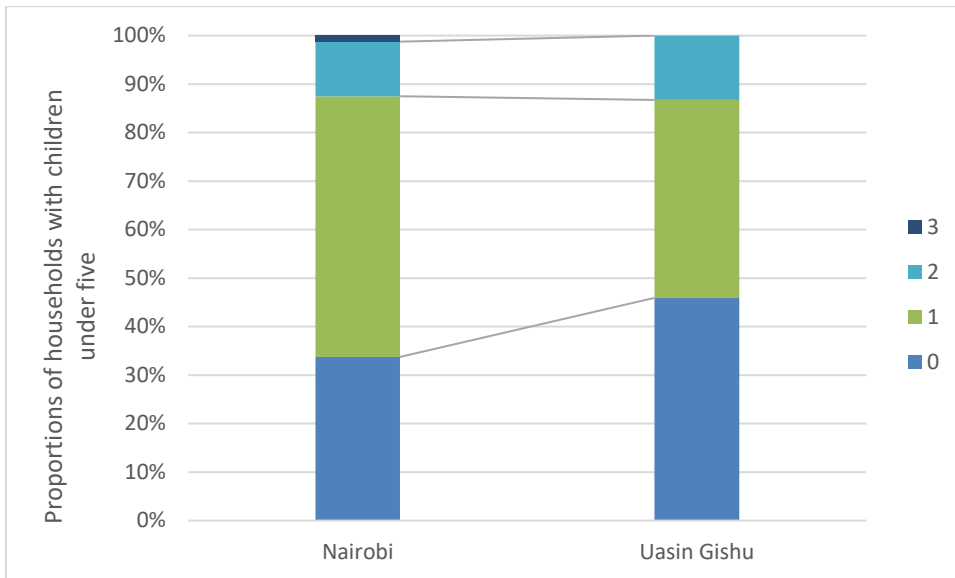


Figure 10: Families with children under five

#### 4.2.2 Characteristics of milk marketing channels

The majority of the respondents consumed milk in both counties, 99% of the total respondents asked, with fewer than three respondents in each county stating they did not consume milk. This was expected since the respondents were approached at the point of purchase and the outliers may have been purchasing milk for other reasons. In addition, the respondents chose the option of consuming milk every day and when asked their preference for the type of milk consumed, the respondents in Nairobi preferred processed milk to unprocessed, while the Uasin Gishu respondents preferred unprocessed to processed milk (see Table 6 and Figures 11 & 12, below).

Table 4: Number of milk consumers in the counties

Milk consumers	Nairobi (N=215)	Uasin Gishu (N=231)
No	3	2
Yes	212	229

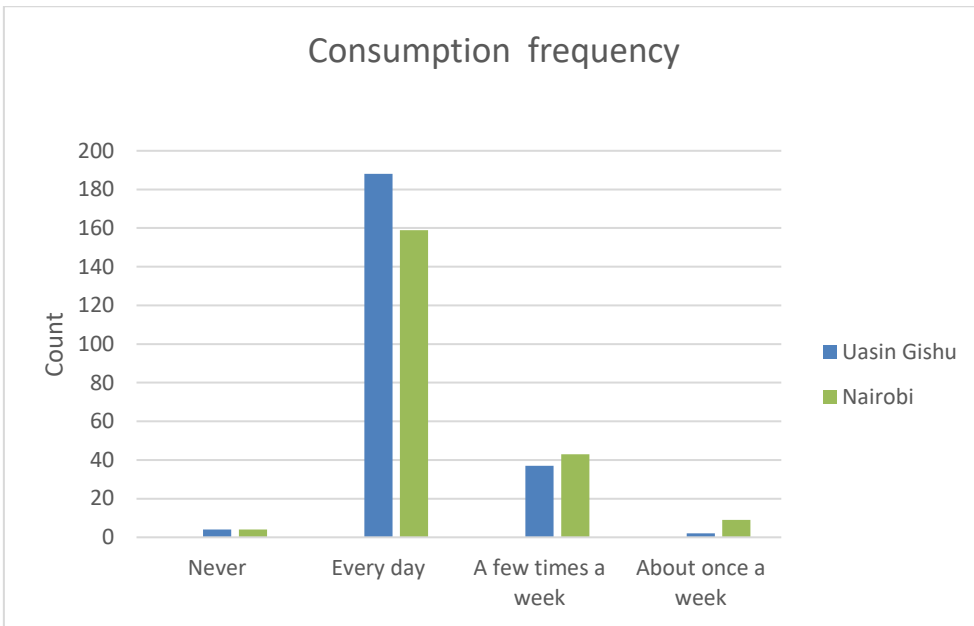


Figure 11: Frequency of milk consumption

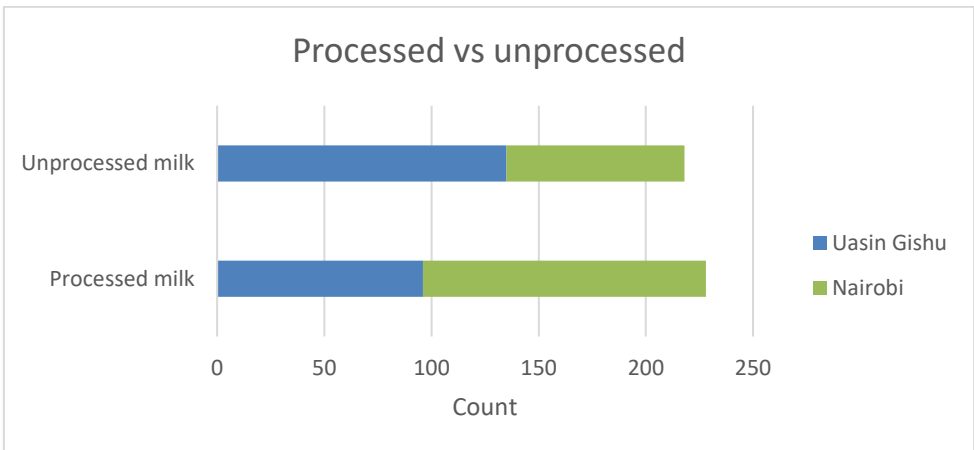


Figure 12: Type of milk preferred

#### 4.2.3 Sources of information for dairy products

The data showed that in both counties, respondents obtained their information on dairy products by word of mouth. This indicated that consumers were dependent on other consumers' perception on information about the dairy products (see Figure 13, below).

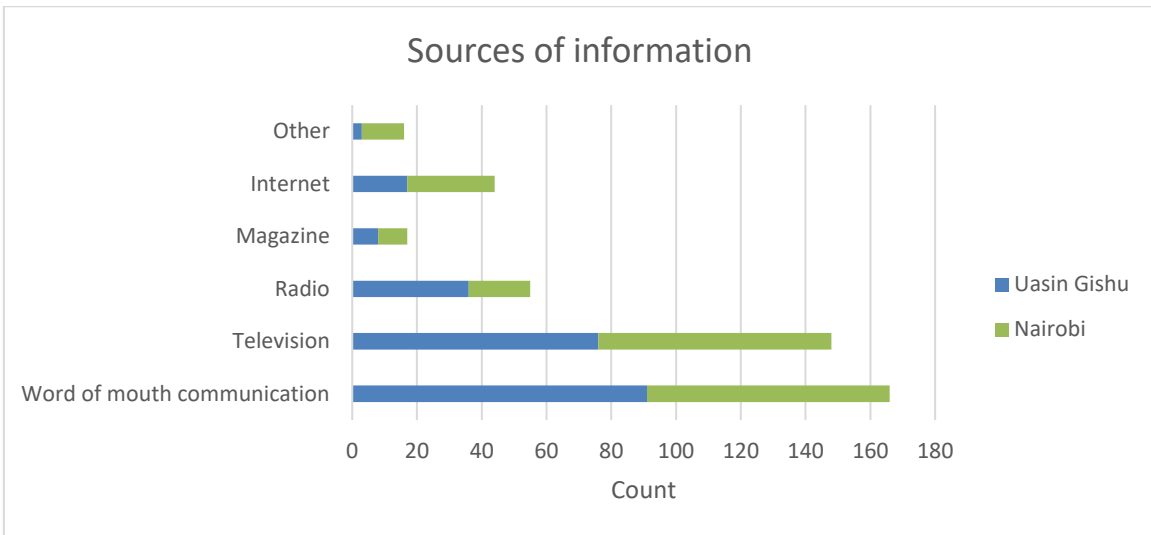


Figure 13: Sources of information

#### 4.2.4 Primary choice of milk outlet

Nairobi recorded the highest number of consumers who purchased from supermarkets, at 42%, while Uasin Gishu recorded farmers as the highest source of milk outlet, at 34%. Milk dispensers were also used more in Nairobi than in Uasin Gishu, with Nairobi accounting for 20% while Uasin Gishu was at 13% (see figure 14 below).

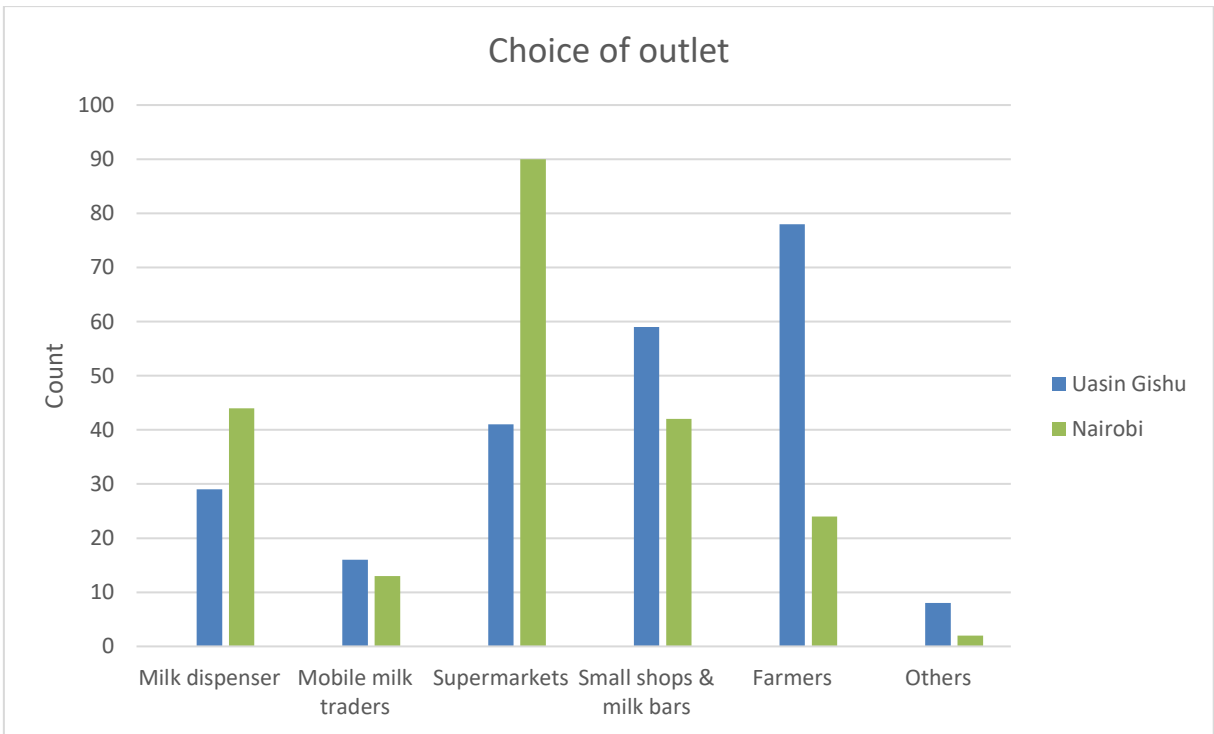


Figure 14: Choice of milk outlet

Eighty-nine per cent of the respondents in both counties claimed to boil milk before consumption. However, when asked the reason why, the majority mentioned that they did so for hygiene purposes (see Tables 7 & 8, below).

Table 5: Consumers who boil milk

Boiling milk	Nairobi (N=215)	Uasin Gishu (N=231)
Yes	174	221
No	41	10

Table 6: Reasons for boiling milk

Reasons for boiling milk	Nairobi	Uasin Gishu
Hygiene purposes	129	195
No refrigerator	20	8
Uncertainty about the milk's freshness	20	19
Because everybody is doing it	1	3
Other	6	6

Respondents were asked whether they perceived milk to be safe after boiling and 91% of the total respondents thought so, with Uasin Gishu county leading, at 94%, and Nairobi, at 88% (see Figure 15, below).

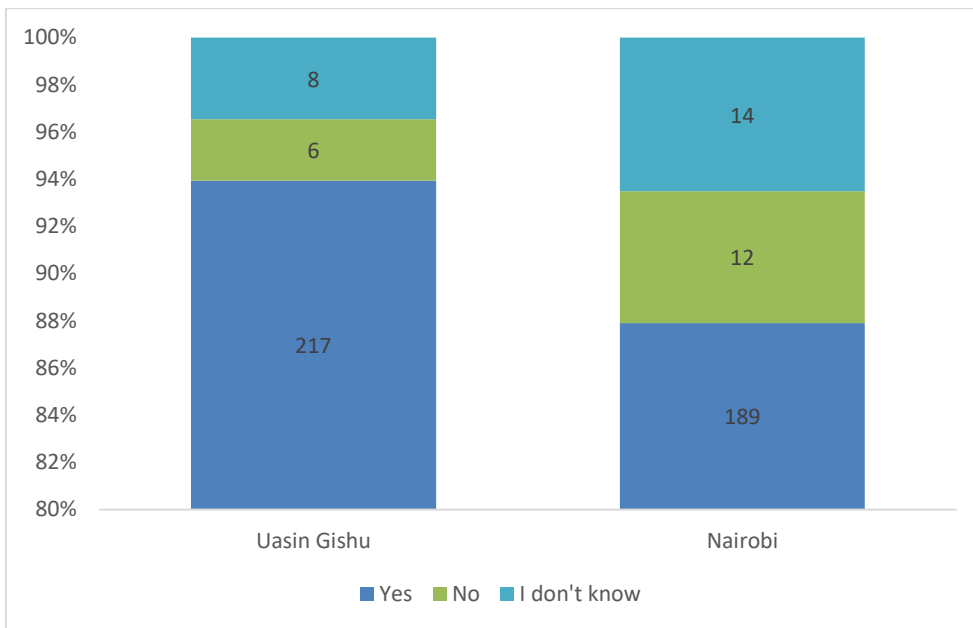


Figure 15: Perception of safety after boiling

#### 4.2.5 Attitudes and perceptions

The respondents were asked to rate how likely they were to choose a different outlet on a five-point Likert scale. The question, 'How likely are you to purchase a different outlet' saw most of the respondents in both counties choosing the 'not likely' option. In Nairobi County, 36% of the respondents indicated they were not likely to choose a different outlet. This was followed by 32% of the respondents who indicated they were neutral, meaning they were indifferent in their choice of milk outlets. While 25% of the Nairobi respondents indicated that they were highly likely to choose a different milk outlet. In Uasin Gishu County, approximately 39% of the respondents indicated that they were not likely to choose a different outlet, while 35% of the respondents indicated that they were highly likely to choose a different outlet and 26% of the respondents indicated they were neutral (Fig 16)

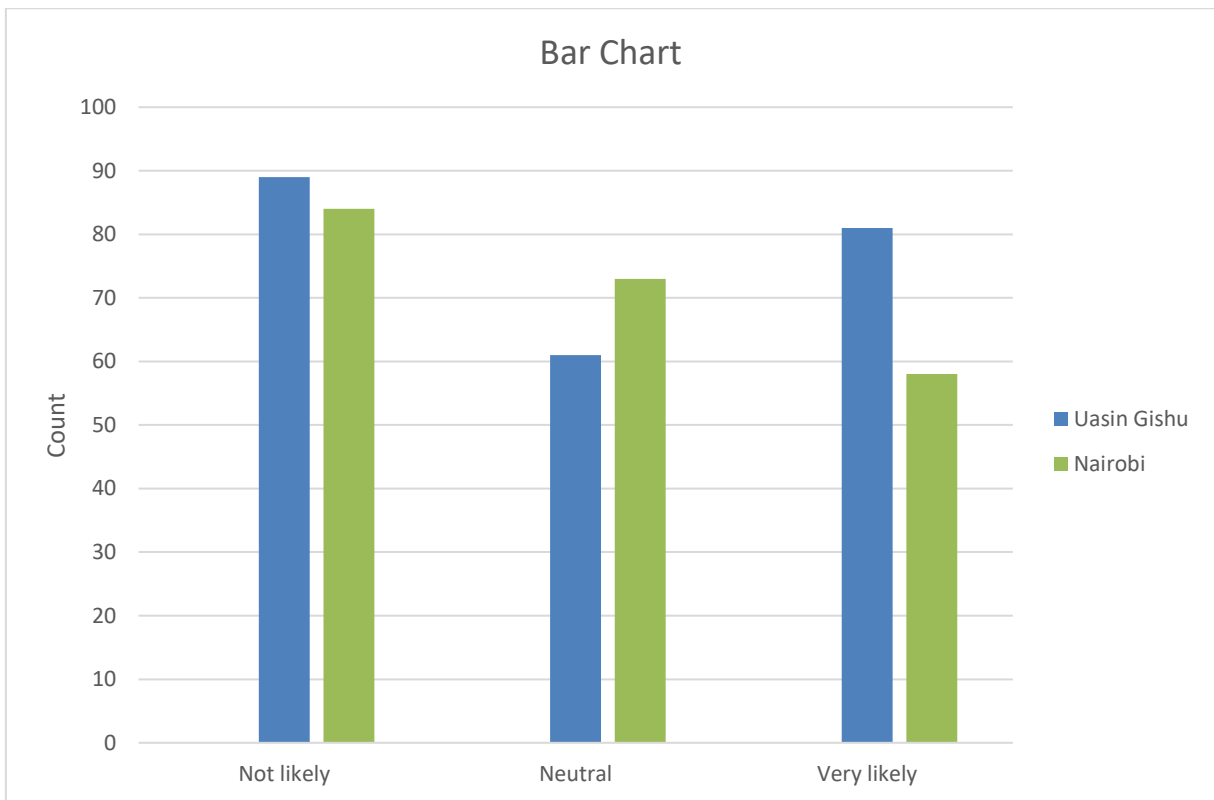


Figure 16: Likelihood of choosing a different outlet

#### 4.2.5.1 Attitudes towards purchasing milk

Respondents were asked statements that aimed to understand their attitudes towards purchasing milk. They were presented with seven 5-scale Likert statements and asked to rate their agreement, ranging from strongly disagree to strongly agree (see Figure 17, below) demonstrates that, generally, the respondents in both counties ‘agreed’ or ‘strongly agreed’ that they believed the milk they were consuming was safe; they preferred packaged milk and believed it was safer to consume and more expensive than unpacked milk. They also agreed that packed milk contained preservatives and disagreed that it was not healthy. However, respondents in both counties agreed with the statement ‘raw milk tastes better’.

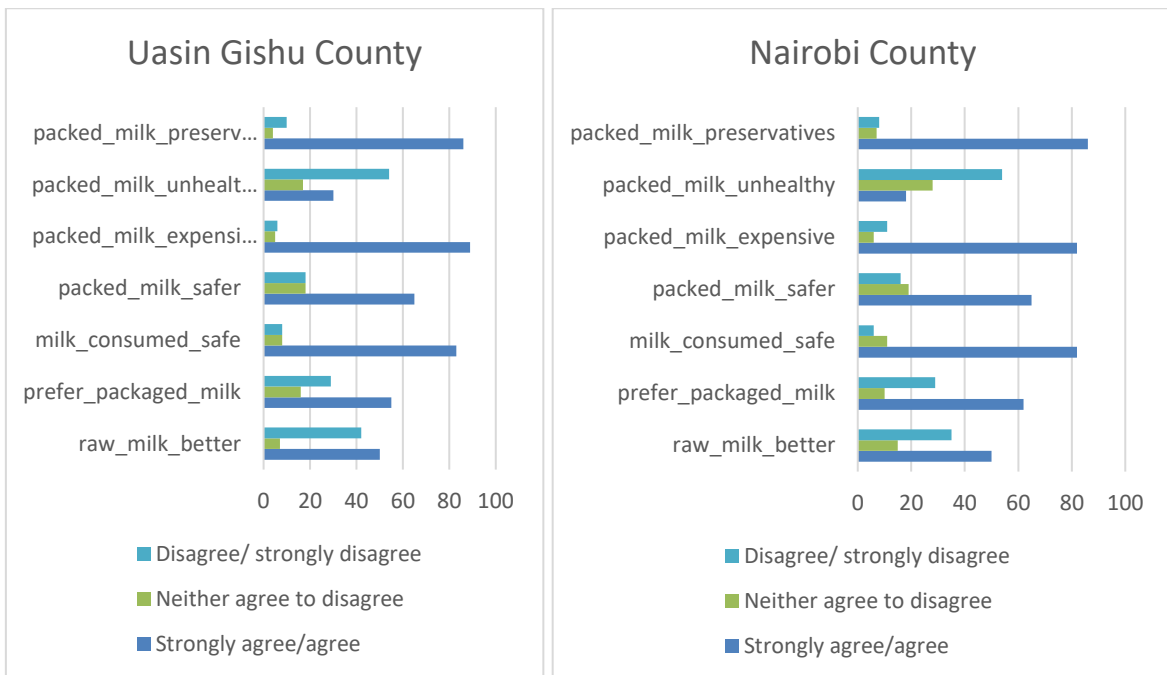


Figure 17: Consumers' perceptions on milk purchases in Uasin Gishu and Nairobi Counties, respectively

#### 4.2.5.1 Perception about type of milk outlet

Respondents were further presented with eight statements with the aim of finding out their perception of the outlets they would purchase milk from. They were presented with 5-point Likert scale and asked to rate whether they considered certain factors to be important when choosing an outlet. The scale ranged from very important, important, neutral and slightly important to not important (see Figures 18 & 19, below). The percentage values were then summed into three categories; important, neutral and not important. It was evident that in both counties, the respondents considered milk quality, outlet accessibility and reputation to be important.



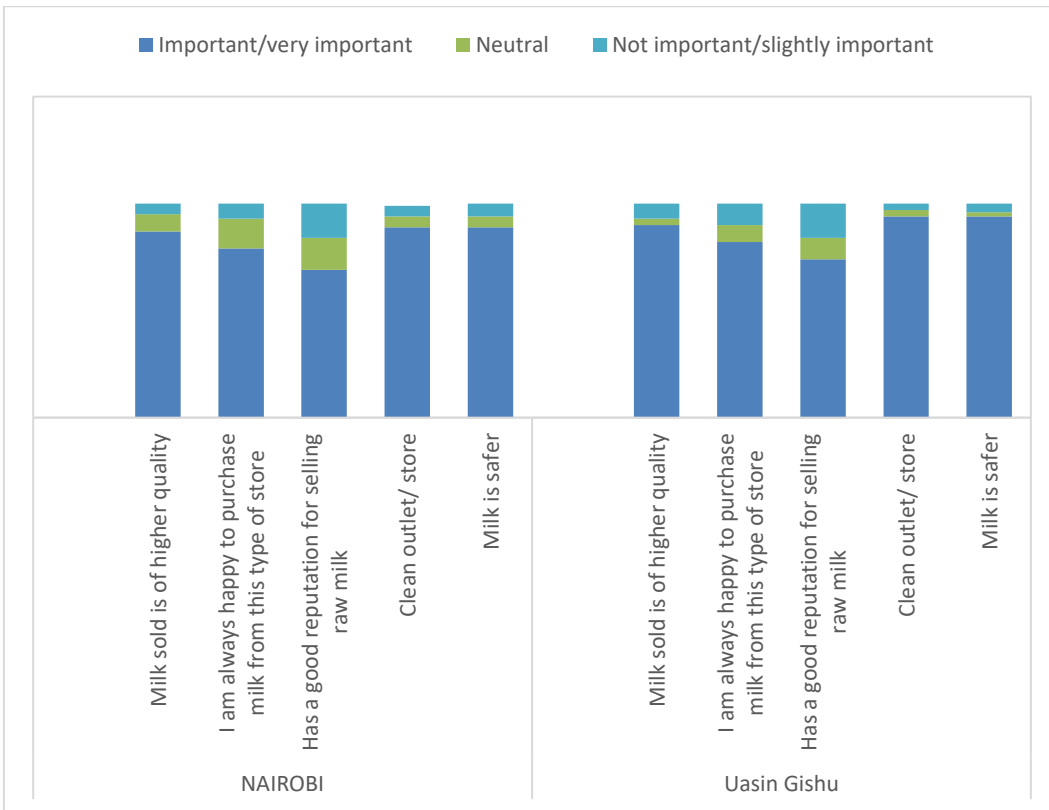


Figure 18: Perceptions of milk outlets in Uasin Gishu and Nairobi

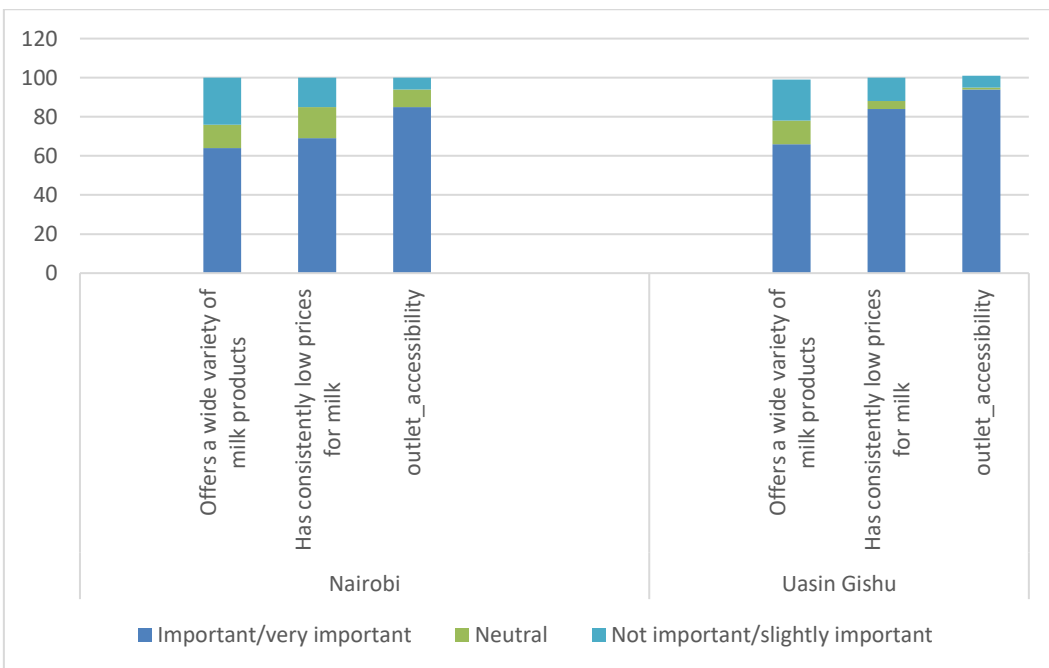


Figure 19: Perceptions of milk outlets in Nairobi and Uasin Gishu

## 4.3 Milk dispensers

### 4.3.1 Use of dispensers

Respondents were presented with three statements and were asked to choose which one was applicable to them. The first statement 'I buy milk from a milk dispenser' saw 44% of the respondents in Nairobi making this selection and 45% in Uasin Gishu. Twenty per cent of the respondents in Nairobi chose the second statement 'I used to buy milk from a milk dispenser but I no longer do now', was similar to the respondents in Uasin Gishu, who accounted for 18%.

The third statement 'I have never bought milk from a milk dispenser' saw 36% of the respondents in Nairobi agreeing to the statement, similar to the 37% of respondents in Uasin Gishu.

Table 7: Information on use of dispensers

	STATEMENTS	NAIROBI (N= 215)	UASIN GISHU (N=231)
1	I buy milk from a milk dispenser	44%	45%
2	I used to buy milk from a milk dispenser but I no longer do now	20%	18%
3	I have never bought milk from a milk dispenser	36%	37%

## 4.4 Preference towards processing level and bivariate analysis

### 4.4.1 Introduction

This section explores the relationship between preferences towards level of processing and a range of demographic and attitudinal factors. This analysis was useful when looking for relationship between the variables and, in this case, the analysis was performed between the preference for processed or unprocessed milk, the factors that influenced the consumption of milk and the choice of milk outlet.

#### 4.4.2 Educational level perception

The respondents who were more educated reported a preference for processed milk, at 24%, with 38% and 12% for polytechnic qualifications, and bachelor and postgraduate degree holders, respectively. Respondents without a tertiary education mostly reported a preference of unprocessed milk (see Figure 20).

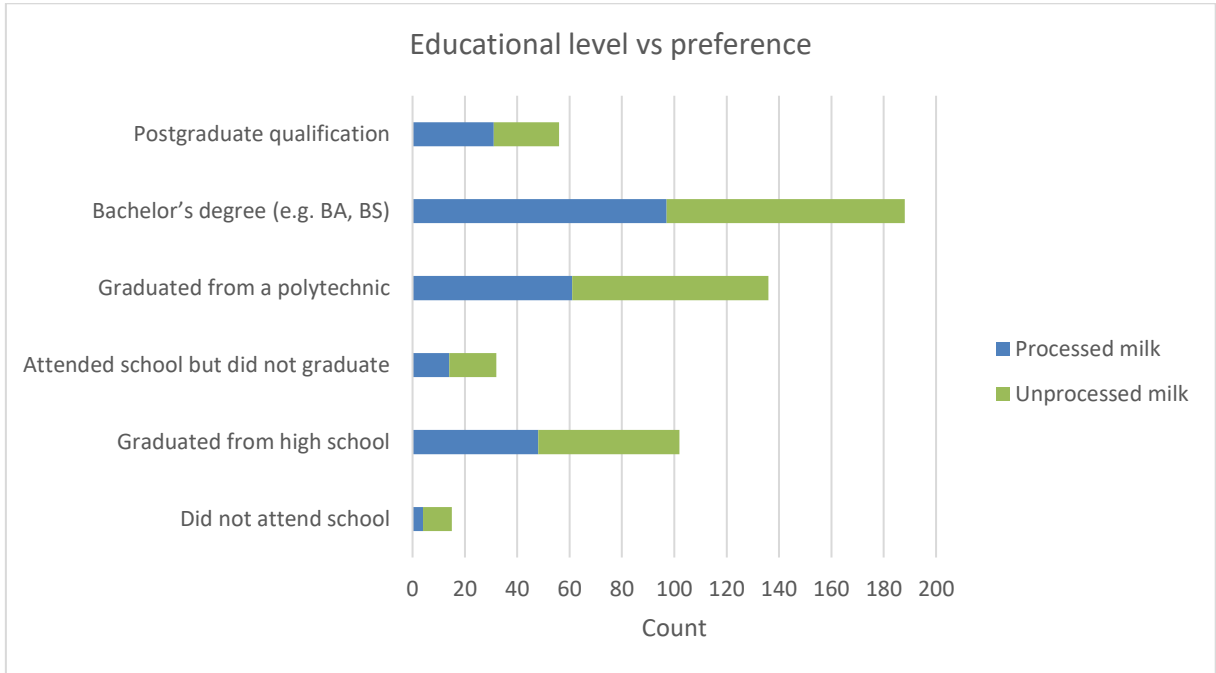


Figure 20: Education level vs preference

#### 4.4.3 Income perception

To show the differences in preferences across income categories, the 'under 40,000' which is the largest category of the range in incomes and the 'don't want to say' group – had a higher proportion of people reporting a preference for unprocessed milk (see Figure 21, below).

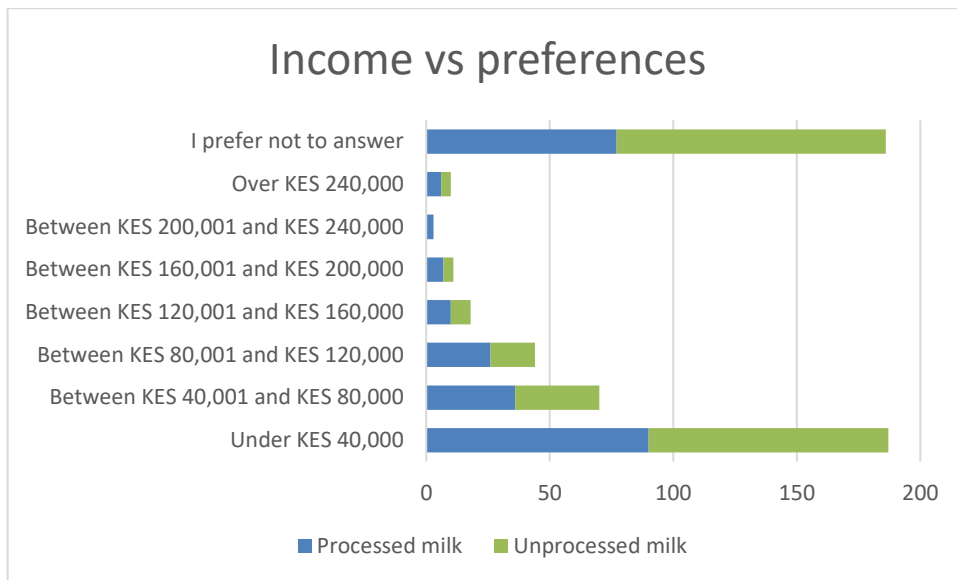


Figure 21: Income vs preference of milk type

#### 4.4.4 Household head

There did not seem to be a distinction between respondents with male-headed households in regard to preference between processed and unprocessed milk (see table 10).

Table 8: Gender of household lead vs preference of milk

		Preference	
		Processed milk	Unprocessed milk
Gender of the household head	Male	201	203
	Female	54	71
Total		255	274

#### 4.4.5 Safety, trust and risk

Cross tabulation between preferences for processed or unprocessed milk revealed that 81% of the respondents who preferred processed milk boiled their milk before consumption, and this corresponded with 96% of the respondents who preferred unprocessed over processed milk, and boiled their milk before consumption. This indicated that the majority of the respondents perceived the milk not to be safe even after processing (see Table 11, below)

Table 9: Preference of milk type and whether they boil before consumption

	Boil milk before consumption	
	Yes	No
Processed milk	206	49
Unprocessed milk	263	11

Eighty per cent of the respondents who boiled milk did so mainly for hygiene reasons for both processed and unprocessed milk. This was followed by 9% of the respondents who felt that they were uncertain about the milk’s freshness (see Table 12, below).

Table 10: Reasons for boiling milk before consumption

		Do you boil milk before consumption?	
		Yes	No
Why do you boil milk?	Hygiene purposes	374	7
	No refrigerator	35	0
	Uncertainty about the milk’s freshness	43	1
	Because everybody is doing it	6	1
	Other	11	5

#### 4.4.6 Perceptions about the use of dispensers

Based on the statements selected (see Table 10) respondents were further asked to rate their likelihood for future use of dispensers. For the first statement, ‘I buy milk from a milk dispenser’, respondents were asked how likely they were to ever purchase milk from a dispenser. They were presented with a 5-point Likert scale and were asked to choose a value of 1 to 5 representing from ‘not likely’ to ‘very likely’. The data showed that in Nairobi County, approximately 17% of the respondents were not likely to recommend buying from dispensers, 25% were neutral while 58% were likely to recommend other people to purchase from dispensers. In Uasin Gishu, 9% were not likely to recommend purchasing from

dispensers, 19% were neutral while 72% were likely to recommend other people purchase from dispensers.

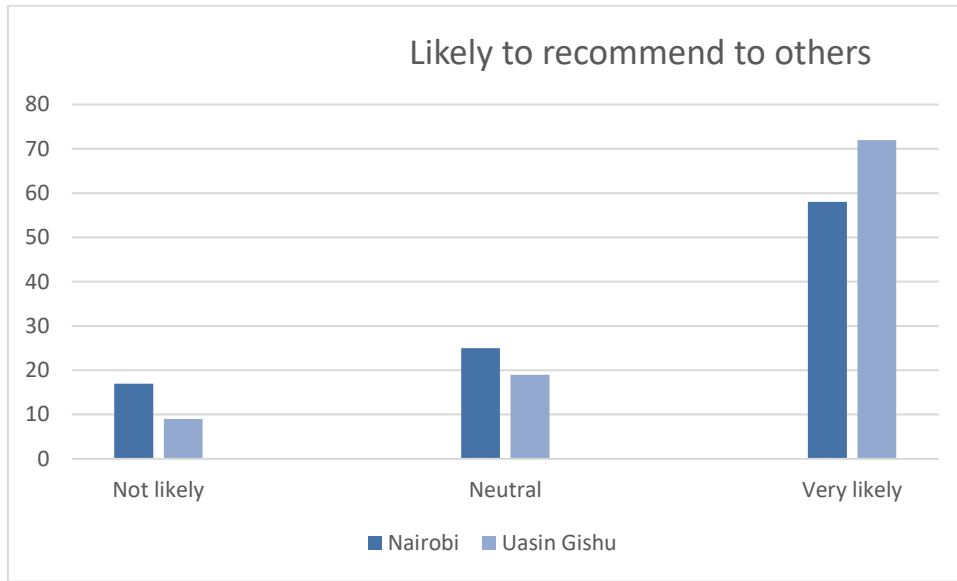


Figure 22: Respondents' likelihood to recommend others to purchase from dispensers

Respondents who chose the statement, 'I used to buy milk from a milk dispenser, but I no longer do now' were then asked how likely they were to ever purchase milk from a dispenser. Using a similar scale as above, the respondents gave the following responses: In Nairobi, approximately 55% of the respondents were not likely to purchase from dispensers again, 29% were neutral while 16% were likely to purchase again from dispensers. In Uasin Gishu, 59% were not likely to purchase from dispensers, 24% were neutral while 17% were likely to purchase from dispensers again.

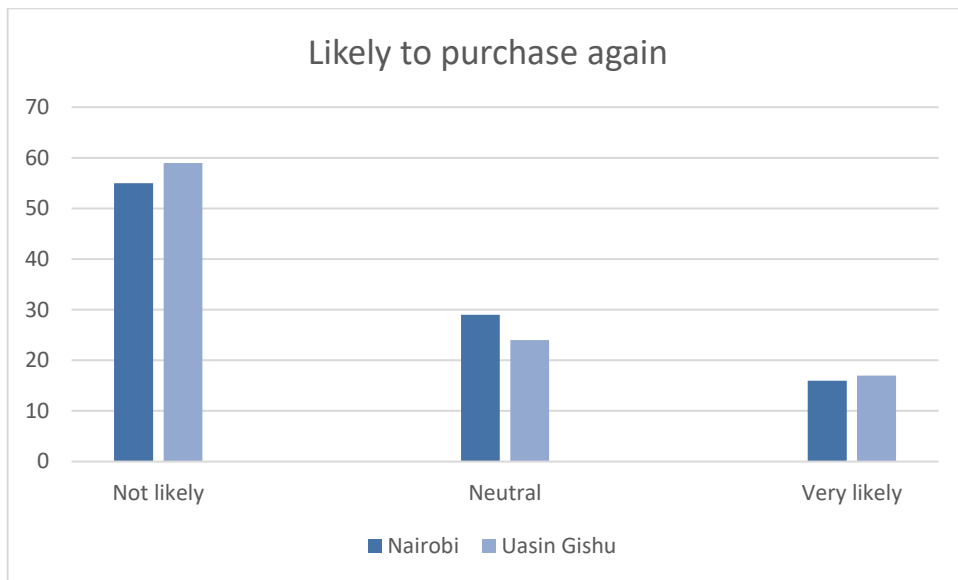


Figure 23: Respondents' likelihood to repeat purchase from dispensers

Finally, respondents who chose, 'I have never bought milk from a milk dispenser' were asked if they were likely to purchase from dispensers in the future. In Nairobi, approximately 55% of the respondents were not likely to ever purchase from dispensers, 29% were neutral while 16% were likely to purchase from dispensers. In Uasin Gishu, 54% were not likely to ever purchase from dispensers, 23% were neutral while 23% were likely to purchase from dispensers.

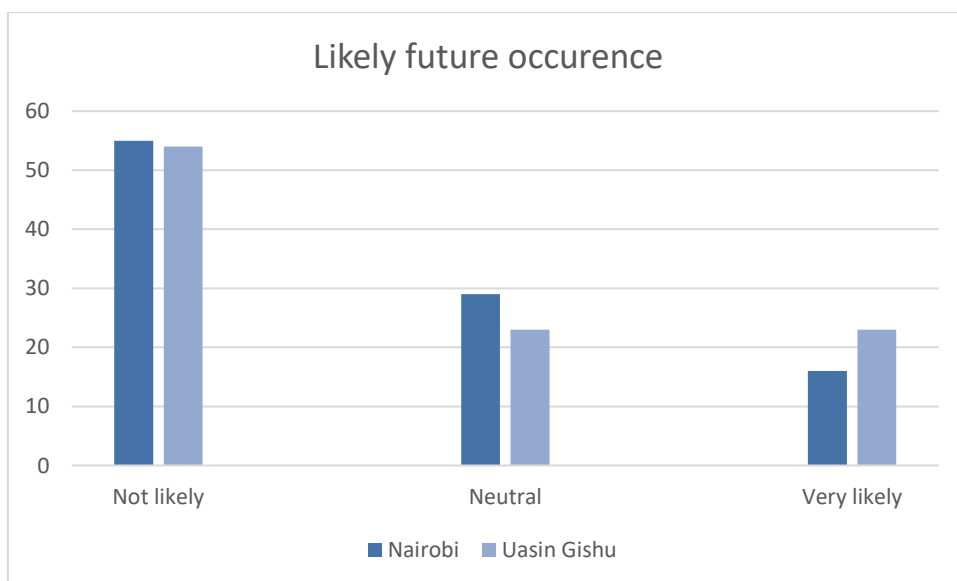


Figure 24: Respondents' likelihood for future purchases from dispensers

## 4.5. Text analysis

This section provides an analysis of the open-ended questions posed to respondents asking about their use of dispensers (see Table 10). The responses were coded for analysis using Nvivo and presented based on the overall tone of the comments in response to the questions. In addition, several themes were identified from the comments that complements the quantitative results obtained from the regression. Section 4.5.1 presents the analysis of the open-ended questions

### 4.5.1 Responses to open-ended questions regarding the behaviour of the use of milk dispensers

The questions that addressed the respondents' use of the dispensers depended on the likelihood to recommend them or not to other consumers, were analysed. The responses were coded into themes depending on the recurring comments.

The majority of the consumers highlighted their concern about the quality of milk bought from the dispensers. This was followed by the price of milk sold at dispensers. The respondents were also concerned with how accessible the milk outlets were, with some stating packaging concerns and, finally, the taste of the milk sold. Table 13 shows a summary of the comments made.

Table 11: Behavioural use of dispensers

Theme	Comment
<b>Trust</b>	'I found out that milk from the dispenser is not of good quality, therefore, preferred packed milk sold in supermarkets' Hygiene is not a guarantee' 'It was adulterated. Was diluted with water'



	'It was going bad after some time'
<b>Affordability</b>	'It's expensive'  'I stopped because the prices were not affordable'
<b>Service</b>	'Poor service'  'Poor service from the dispenser agents'
<b>Accessibility</b>	'I cannot locate one from where I reside now'  'Because of long queues'  'Not readily accessible to me'
<b>Packaging</b>	'I am tired of carrying containers'  'Carrying packaging jars is a hectic task'
<b>Taste</b>	'Packed milk is tasty'  'Has a different taste that I don't like'

## Chapter 5

### Empirical analysis of the choice of milk outlet

This chapter presents an analysis of the factors that influenced consumers when selecting outlets selling processed or unprocessed milk using a binomial logit regression model.

#### 5.1 Data considerations

##### 5.1.1 Data reduction

Data reduction was performed with the use of principal component analysis (PCA). PCA was used to construct several indexes that captured information on domains that were hypothesised to influence consumer decisions on fresh milk. The analysis was applied to 32 questions measuring the consumers' choice of outlet and factors influencing the purchase of milk from the outlet selected.

The analysis revealed five components that had eigenvalues greater than one (Gaskin & Happell, 2014). The five-component solution captured 64.3% of the total variation in the data. The Varimax orthogonal rotation was used to assist in the interpretation since it was found to exhibit a 'simple structure'. Each component in the final solution was consistent with domains of attitudes and perceptions the questionnaire was meant to capture, with each item loading strongly onto only one component. The rotated solutions are presented in Table 14 and the relevant variables are shown with strong loadings highlighted in bold.

Table 12: 5 Components achieved

Rotated Component Matrix <sup>a</sup>	Component				
	1	2	3	4	5
Honesty of sellers	<b>.854</b>	.043	-.090	.013	.005

Comply sellers regrouped	<b>.803</b>	-.015	.003	.054	.039
Knowledgeable sellers regrouped	<b>.783</b>	.110	-.012	-.072	.071
Concerned sellers regrouped	<b>.732</b>	.078	-.131	.012	.006
Handling sellers regrouped	<b>.670</b>	.025	.133	-.011	-.062
Milk bought from my primary source is of good quality	.078	<b>.849</b>	.097	.027	-.033
I think milk bought from my primary source is safe	.072	<b>.828</b>	.019	-.038	.002
The risk of milk going bad is low when I buy milk my primary source	.047	<b>.815</b>	-.016	.000	-.021
Safer milk	.020	.032	<b>.844</b>	.034	.037
Clean outlet	-.020	.030	<b>.798</b>	.157	.119
Quality	-.073	.035	<b>.635</b>	.229	-.123
Location	-.043	.035	.043	<b>.800</b>	.079
Quantity	.031	-.042	.173	<b>.748</b>	.047
Price	.015	-.008	.164	<b>.682</b>	-.145
Prefer packaged	.032	-.074	.044	.001	<b>.869</b>
Packed safer	.005	.024	-.010	-.015	<b>.862</b>
Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization. <sup>a</sup>					
a. Rotation converged in 5 iterations.					

The five indexes represented different domains and were measured for reliability using Cronbach's alpha. Internal consistency with Cronbach's alpha values above 0.7 indicated a good level of internal consistency (Hooper, Coughlan, & Mullen, 2008; Keszei, Novak, & Streiner, 2010). The first construct measured the 'perception of sellers' and consisted of five

questions. The second construct measured ‘consumers’ attitude about the primary outlet ‘and consisted of three questions. The third construct measured ‘attributes of outlets’ and had three questions. The fourth construct measured ‘specific factors about the outlets’ and consisted of three questions, while the fifth and final construct measured ‘general preference’ and consisted of two questions.

The table below presents the five new indexes obtained and renamed as variables.

Table 13: Indexes achieved

Index Variable name	Items in the index	Cronbach’s alpha
Sellers perception index	Captures consumers perception of sellers on honesty, knowledge, concern, handling skills and ability to comply	0.803
Attitude primary outlet index	Captures consumer perception of primary outlets on quality, safety, and risk.	0.772
Attributes outlet index	Captures qualitative factors on cleanliness, quality, and safety of milk sold from the outlet.	0.680
Factors outlets index	Captures factors affecting consumers’ choice of outlet; location, quantity, and price	0.610
General preference index	Captures general preference o for milk preferences about packaging and considered packed milk as safer	0.705

### 5.1.2 Data suitability

Prior to data analysis using the logistic regression, the data were checked to ascertain whether several assumptions were met. This was to ensure the accuracy of the predictions, to test the model fit, and, finally, to test the relational hypothesis for which the model was

built. Violations of the assumptions would indicate amendments would be necessary or would require the use of a different model to analyse the data.

The assumptions tested and met in the model were: confirming that the dependent variable was dichotomous, and that there was a variety of continuous or nominal variables to use as independent variables, ensuring the independence of observations, checking if the categories of the dependent and nominal independent variables were mutually exclusive and exhaustive with sufficient cases per independent variable.

Moreover, the variables were tested for linearity to ensure there was a linear relationship between the dependent variables and the logit transformation of the dependent variables, as well as checking for multi-collinearity and significant outliers in the data. The Box-Tidwell procedure was used to test the continuous variables for linearity in the logit (Box & Tidwell, 1962). Based on this assessment (Table 14), all continuous independent variables were found to be linearly related to the logit of the dependent variable (Tabachnick, Fidell, & Ullman, 2007).

Table 14: Variables showing linearity

	B	S.E.	Wald	df	Sig.
Step 1 <sup>a</sup> Seller's perception	-171.888	34425.331	.000	1	.996
Attitude primary outlet	174.932	26181.540	.000	1	.995
Attributes outlet	-1703.114	248225.938	.000	1	.995
Factors outlets	67.461	42153.752	.000	1	.999
General preference	-561.175	67737.083	.000	1	.993
<b>Natural log Transformation of seller's perception by seller's perception</b>	171.447	25613.277	.000	1	.995
<b>Attitude primary outlet by Natural log Transformation of Attitude primary outlet</b>	-570.934	72308.104	.000	1	.994
<b>Attributes outlet by Natural log Transformation of Attributes outlet</b>	2717.557	555103.112	.000	1	.996
<b>Factors outlets by Natural log Transformation of Factors outlets</b>	187.223	45806.640	.000	1	.997

<b>General preference by Natural log Transformation of General preference</b>	844.153	99536.845	.000	1	.993
Constant	2291.792	329495.008	.000	1	.994

The inspection for outliers indicated that there was no Studentized variable with a value greater than three standard deviations and, thus, all cases were kept (see Table 17)(Barnett & Lewis, 1974; Hawkins, 1980). Further, the area under the receiver operating characteristic (ROC) curve was 0.827, 95% CI [.788, .865], which was an excellent level of discrimination according to Hosmer Jr, Lemeshow, and Sturdivant (2013). This is shown in Figure 25. The area under the curve relates to the ability of the model to classify the dependent variables into two groups of the dichotomous dependent variable. The blue line is above the red line, which demonstrates that the model discriminated the data well (Figure 25).

Table 15: Checking for outliers

Casewise List <sup>b</sup>							
Case	Selected Status <sup>a</sup>	Observed Two_outlets	Predicted	Predicted Group	Temporary Variable		
					Resid	ZResid	SResid
24	S	D**	.125	F	.875	2.644	<b>2.062</b>
156	S	D**	.100	F	.900	3.007	<b>2.178</b>
243	S	F**	.915	D	-.915	-3.290	<b>-2.264</b>
254	S	D**	.114	F	.886	2.781	<b>2.114</b>
275	S	F**	.895	D	-.895	-2.922	<b>-2.172</b>
358	S	F**	.883	D	-.883	-2.754	<b>-2.117</b>
512	S	F**	.860	D	-.860	-2.483	<b>-2.012</b>

a. S = Selected, U = Unselected cases, and \*\* = Misclassified cases.

b. Cases with Studentized residuals greater than 2.000 are listed.

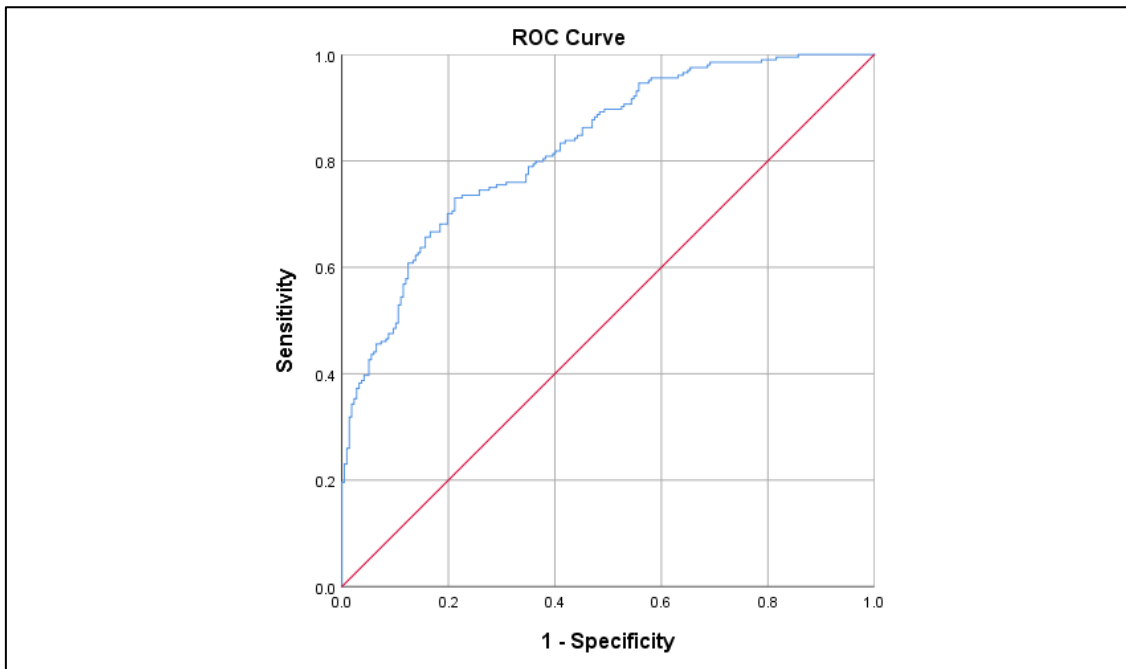


Figure 25: ROC Curve showing the sensitivity and specificity of the data

## 5.2 Logistic regression

The dependent variable as choice of outlet took two values; outlets that sold processed vs unprocessed milk. The explanatory variables were; county of consumers, gender, employment status, age, marital status, gender of household head, monthly income and educational level. Other predictor variables were the perception of milk outlets, sellers and preference for milk type.

The logistic regression revealed nine statistically significant relationships between the explanatory variables and the type of milk outlets. The logistic regression model was statistically significant,  $\chi^2(4) = 161.543, p < .001$ . The model explained had a Nagelkerke  $R^2$  value of 42.5% and correctly classified 75.5% of cases. The sensitivity was 70.6%, specificity was 80.2%, the positive predictive value was 77% and the negative predictive value was 74.36%. Of the 16 predictor variables only nine were statistically significant: county, gender of household head, households with children, and preference of milk type sold, boiling

before consumption, employment, income, education, and attributes of outlets index (Table 18).

The results indicated that when holding all other variables constant, the odds that residents of Nairobi will purchase processed milk were 4.8 times higher than the odds that residents of Uasin Gishu will purchase processed milk. An increased level of education was associated with an increased likelihood of purchasing milk from outlets selling processed milk while unemployment was associated with a decreasing likelihood of purchasing from outlets selling processed milk. Female-headed households were associated with an increased likelihood of purchasing from outlets selling processed milk. Respondents who preferred unprocessed milk were likely to purchase milk from outlets selling unprocessed milk while respondents who boiled milk before consumption were more likely to purchase milk from processed outlets. Respondents who considered the safety of milk sold, quality and cleanliness of outlet as important were likely to purchase milk from outlets selling processed milk. Finally, respondents with earnings ranging from KES 80,000 to 120,000 were likely to purchase milk from outlets selling processed milk.

Table 16: Binomial regression results

		Variables in the Equation						95% C.I. for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1 <sup>a</sup>	Attributes outlet	.249	.124	4.042	1	.044*	1.283	1.006	1.636
	County			29.440	2	.000*			
	County (1)	1.572	.292	29.050	1	.000*	4.815	2.719	8.526
	County (2)	1.102	.382	8.315	1	.004*	3.010	1.423	6.365
	Households with children (1)	.720	.271	7.088	1	.008*	2.055	1.209	3.492
	Gender of household head (1)	.706	.285	6.133	1	.013*	2.026	1.159	3.544
	Preference of milk type (1)	-1.416	.254	30.999	1	.000*	.243	.147	.400
	Boiling before consumption (1)	.866	.465	3.468	1	.063**	2.379	.956	5.921
	Employment regrouped			8.628	2	.013*			
	Employment regrouped (1)	-.761	.396	3.691	1	.055**	.467	.215	1.015



Employment regrouped (2)	.149	.376	.156	1	.693	1.160	.555	2.426
Income regrouped			7.377	4	.117			
Income regrouped (1)	.011	.292	.001	1	.971	1.011	.570	1.791
Income regrouped (2)	.317	.417	.578	1	.447	1.373	.607	3.106
Income regrouped (3)	1.403	.550	6.492	1	.011*	4.065	1.382	11.958
Income regrouped (4)	.407	.572	.506	1	.477	1.503	.489	4.614
Education regrouped			25.018	2	.000*			
Education regrouped (1)	1.175	.292	16.142	1	.000*	3.238	1.825	5.743
Education regrouped (2)	2.427	.551	19.422	1	.000*	11.324	3.848	33.323
Constant	-1.826	.480	14.492	1	.000*	.161		

(\*Significant at < 0.05 and \*\* significant at < 0.1)

The nine significant results referenced, above, measure the extent to which the variables affected the type of outlet selected. Holding all other variables at their mean, the marginal effects can be determined (Table 19, below).

Table 17: Marginal effects of significant variables

<b>VARIABLE</b>	<b>MARGINAL EFFECTS</b>
<b>County</b>	
Nairobi	0.374
Other	0.264
<b>2. Lead gender</b>	.174
<b>2.Households_children</b>	.178
<b>2.Type_milk</b>	-.340
<b>2.Boil_milk</b>	.208
<b>Employment</b>	
Unemployed	-.184
Employed	.037
<b>Income (KES)<sup>2</sup></b>	
Under 40,000	.003
40,000-80,000	.079
80,000-120,000	.320
Over 120,000	.101
<b>Education</b>	
Bachelors & polytechnic qualifications	.275
Postgraduate qualification	.537
<b>Attributes of outlets</b>	.062

<sup>2</sup> US\$ = KES 101.18

As there were only two categories; unprocessed milk-selling outlets and processed milk-selling outlets, while holding everything else constant, it can be determined that the predicted probability of Nairobi residents purchasing from outlets selling processed milk increased by 37% relative to Uasin Gishu residents. In terms of the gender of the household head, the predicted probability of purchasing from outlets selling processed milk was 0.173 greater for females than for males. The predicted probability of selecting a processed milk outlet was approximately 30% lower for consumers who prefer unprocessed milk. The probability of consumers selecting outlets with processed milk was expected to increase by 17.8 percentage points when the household had children. Boiling milk before consumption was expected to increase the probability that consumers will choose a processed outlet by nearly 21%. The predicted probability of selecting a processed outlet decreases by 18.3% for unemployed consumers, while being employed increased the probability by 3.6%.

Taken together, the marginal values associated with the income variable implied that as income increases, consumers were more likely to purchase from outlets selling processed milk. If the respondents have bachelor or polytechnic qualifications, the probability of selecting outlets with processed milk will increase by 27.53%. If the respondents have postgraduate qualifications the probability of selecting outlets with processed milk is expected to increase by 53.69%. This suggested that the more educated a consumer was, the more likely they were to purchase processed milk. Finally, the predicted probability of selecting an outlet with processed milk increases for consumers who are relatively concerned about the general level of cleanliness and risk associated with the outlet.

### **5.3 Summary**

The data analysis presented in this chapter was directed by the main research objective; understanding consumers' preferences towards milk purchases. The univariate analysis

described the characteristics of the Kenyan consumer and their attitudes and perceptions towards milk purchases and specific outlets. The bivariate analysis explored the potential relationships between the characteristics of the Kenyan consumer and attitudes and perceptions towards milk purchases, together with the choice of milk outlet. The text analysis provided an in-depth summary of the reasoning behind milk purchases from the dispensers. A multivariate analysis evaluated the information from the conceptual model and determined the relationship between choice of milk outlet and an array of explanatory variables. The following chapter will discuss the key findings presented in this chapter relative to the review of the literature in chapter 2.

## Chapter 6

### Discussion, Recommendations and Conclusions

#### 6.1 Introduction

The data analysis presented in chapter five was directed by the main research objective; what are the factors that affect the milk purchase in Kenya? The following chapter discusses the key findings from the study in relation to the review of the literature presented in chapter 2.

#### 6.2 Key findings

The study's key objective was to identify the factors influencing the choice of fluid milk by consumers in Kenya, focusing specifically on the purchase of processed versus unprocessed milk. The results of the study revealed that a number of characteristics were likely to increase the likelihood of consumers buying milk from outlets selling processed milk. These included: being better-educated; having higher levels of income; being in a female-headed household; having children; having a preference for processed milk and; boiling milk before consumption. In terms of consumers' characteristics, age and marital status were not significant in this study. This was contrary to the findings of De Alwis et al. (2011). Households with female heads and children, were likely to purchase milk from outlets selling processed milk. A possible explanation for this finding was that families tended to consider the safety of milk for their children, as well as indicating a preference for processed milk. Educational level was significant when it came to selecting outlets selling processed milk. This finding was consistent with Shahzadi et al. (2017) who found that educational level affected how consumers perceived safety. Their study also found that highly educated people would choose outlets selling processed milk and this was supported by the findings in this study.

The results also indicate that households with children under the age of five were likely to purchase processed milk in Nairobi and unprocessed in Uasin Gishu County. This finding could

suggest that for Nairobi residents who mostly reported supermarkets as their primary outlet, processed milk would likely be accessible. While, Uasin Gishu residents would likely purchase from farmers and thus unprocessed, since it is accessible and available in variable quantities. In addition, the results implied that those with higher incomes are more likely to purchase processed milk. It may also be the case that higher income affords consumers with choices, and they were likely to consider the safety of milk when making a purchase.

In addition, consumers in both Nairobi and Uasin Gishu Counties were likely to purchase processed milk implying that preferences may be changing since a higher proportion of urban consumers report a preference for processed.

In terms of consumers' perception about choice of outlets, it is seen that consumers are driven by different factors when selecting outlets. Results from the qualitative analysis show that consumers consider safety of milk, taste, accessibility, trust, service, packaging and affordability. Whilst the logistic model did not highlight price as a key variable in the choice between processed and unprocessed milk, the comments made by respondents did indicate its importance. This suggests that actions that can reduce the price of processed milk may have a positive impact. This could be through improving the efficiency of the supply chain or making lower priced processed milk options more attractive. For example by tackling concerns about the quality of milk from dispensers which were raised by some respondents to the survey.

The index used to measure the attributes of outlets was statistically significant in outlets selling processed milk. This finding suggested that consumers who perceived the safety of milk sold, quality and the cleanliness of outlet as important were more likely to purchase from both supermarkets and milk dispensers. This suggested that consumers consider attributes of an outlet when purchasing milk from the outlets and was found by (Adede & Kinoti, 2016; Gulseven & Wohlgenant, 2017; Rahnama & Rajabpour, 2017).

Consumers with a preference for unprocessed milk were likely to purchase from outlets selling unprocessed milk; however, consumers reported a preference for self-processing of the milk they bought, regardless of the milk type. There are several possible explanations for this result. The first is related to culture as previous studies have found that Kenyans have a general preference to boil milk before consumption even if there was no specific reason for doing so in terms of concerns over the safety of the milk (Kaitibie et al., 2010; Omore et al., 2005). Second, it is possible that self-processing served as an indicator of a lack of trust in the milk sold.

Finally, the study found that consumers obtained their information about dairy products from word of mouth references. This indicates that consumers were likely to trust the opinion of other consumers when purchasing milk from the outlets. Interestingly, consumers reported that they were not likely to purchase from different outlets indicating a satisfaction with their primary outlets. This is because they perceived milk bought from their primary source as safer and higher quality. They also considered the cleanliness of the outlet and whether the outlet had a good reputation. This would likely explain why the consumers would use word of mouth references when making purchases.

## **6.3 Recommendations**

This section provides recommendations on the third research question, 'What are the implications of policy concerning the development of the formal sector in Kenya? First, a discussion on the milk trade will be presented. This will be followed by recommendations for policy.

### **6.3.1 Policy implications**

The current structure of the industry showed that most of the milk sold was channelled through the informal sector. However, policies in place supported the growth of the formal

sector not the informal one. Previous studies have looked into the importance of the informal sector (Kaitibie et al., 2010) and provided recommendations that would enable the growth and increase milk vendors participation of informal market. Current regulations within the Kenyan dairy sector, among other things, state that 'a person shall not sell, offer for sale or expose for consumption any milk in raw form' (Kaitibie et al., 2010). Therefore the regulations in place largely indicate a lack of intention for legalising the informal sector. Efforts to remove (or at least significantly reduce) the informal sector will have a number of consequences, key among them is an impact on unemployment, since the informal sector was responsible for 70% of the dairy jobs in the industry.

KDB has currently formed a taskforce to seek views from stakeholders in the dairy sector. While regulations were necessary for the growth of the formal sector over the informal sector, the fact that the majority of milk was sold in the informal sector brought the call to have regulations set that target the well-being of the informal actors. The proposed new regulations that called for the complete banning of milk sold in the informal sector meant that employment and nutrition would be affected, as well as consumers' access to milk, especially Kenyans from lower socio-economic backgrounds.

The results suggests that putting effective (in terms of being monitored and enforced) safety regulations in place with consequences for non-compliance would assist with the transformation of the industry. Part of this process could involve more stringent monitoring of the milk sold in milk dispensers since the dispensers provide a platform to encourage the purchase of processed milk. In addition, streamlining the value chain (reducing the number of stages and or actors) could help improve the traceability of the milk from the producers to the consumers. Encouraging farmer cooperatives may be one way to streamline the value chain which also could facilitate traceability from farm to bottle.

Furthermore, the qualitative analysis showed that price was an important factor influencing milk purchases. Currently, the cost of milk production is estimated at KES 17 per litre making it considerably more expensive when compared to developing countries with higher GDP per capita incomes. The milk glut experienced in seasons of high production and inadequate use of the processing units in low seasons could suggest that there are inefficiencies in the supply chain and expanding the processing sector utilisation rates could help improve the situation by encouraging sales in the formal sector.

Finally, consumer education on the benefits of purchasing processed milk would likely ensure the growth of the formal sector. The results of the study could be used to leverage change in the dairy sector by understanding the drivers behind the demand side.

## **6.4 Study limitations, contributions and future research**

### **6.4.1 Study limitations**

There were several limitations to the study. Due to time and resource constraints the study area was limited to two counties. The study areas were chosen to provide variability in data in terms of consumers' demand for milk, but it may not be possible to generalise the findings to the whole of Kenya.

The analysis of the data was also limited to the logistic regression which categorised the outlets according to the type of milk sold. This limits the information that could be derived from the outlets as per the range of factors that would influence consumers to choose one outlet over the other. However, given the data available, the regression provided the best model to understand the type of milk between processed and unprocessed milk.

### **6.4.2 Study contributions and future research**

The study probed the attitudes and perceptions of dairy consumers and revealed important factors related to milk consumption and purchase. Since policies have historically been



driven with producers in mind, this study contributed to the body of knowledge and literature on consumer behaviour in regard to milk purchasing. It also sheds light on the use of milk dispensers. The findings provided recommendations on how to grow the formal dairy sector by understanding the driving factors behind consumers' demands.

A probable area of future research would be to investigate the milk outlets in Kenya in detail and the factors that would influence the growth of the outlets. The importance of investigating the factors that affects use of the milk outlets may provide insights into the growth of the Kenyan dairy sector.

## **6.5 Conclusions**

This study set out to understand milk purchasing behaviour in Kenya. A survey was undertaken of milk consumers in two regions of Kenya and a binomial logistic regression model was used to analyse the factors affecting the choice of milk outlet. The results of the study revealed that a number of characteristics were likely to increase the likelihood of consumers buying milk from outlets selling processed milk. These included: being better-educated; having higher levels of income; being in a female-headed household; having children; having a preference for processed milk and; boiling milk before consumption.

Despite the research being centred on only two regions of Kenya, the findings provide some insights that may help inform the development of policies concerning the milk sector of Kenya. Since policies, historically, have targeted the growth of the formal sector, our findings highlighted certain preferences, which may suggest simply banning informal markets is not the answer and that policymakers should look at the broader issue of safety. There is a need to increase consumers' trust in milk sold in the formal sector, thereby placing an emphasis on the growth of the dairy sector from the demand side.

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# Appendix A

## Survey Questionnaire

Name of consumer .....

(Enumerator).....

Date.....

This questionnaire seeks to help us understand milk purchase behaviour in Kenya. The research is being undertaken as part of my Master of Commerce (Ag) degree at Lincoln University, New Zealand. The data collected will be used for the said purpose only. Your identity will be held with strictest confidence. We expect that the survey will take about 15 to 20 minutes for you to complete. Below, are some questions to assist in understanding the dairy sector and what influences a consumer to buy milk from a given outlet. The questionnaire contains two sections. Kindly respond to all questions by ticking the space provided or by explaining your opinion briefly in the space provided. This research is voluntary, and you can withdraw anytime.

If you have any questions, you can contact me on 0225384546/0727776088 or email

Sharon.chemweno@lincolnuni.ac.nz

Thank you,

Sharon Chemweno

### **Section A**

First, we want to ensure that we have a representative sample, here are 10 questions we would like to ask about you. Please answer by selecting the option that relates to you.

1. What is the name of the county you live in?

Nairobi

Uasin Gishu

Other (Please specify) .....

2. What is your gender?  Male  Female

3. What is your current employment status?

Employed full time

Unemployed and currently looking for work

Unemployed and not currently looking for work

Student

Retired

Self-employed

Unable to work

Other (Please specify) .....

4. Which of the following categories best describes your age?

< 18

19-24

25-34

35-44

45-54

55-64

65 >

5. What is your marital status?

Never married

Married

Widowed

- Separated
  - Divorced
6. What is the gender of the head of the household?  Male  Female
7. Do you have any children?  Yes  No
8. If (Yes), do you mind telling me how many children live in your household and how old are they?
- .....
9. Which of these categories best describes your average monthly income?
- Under KES 40,000
  - Between KES 40,001 and KES 80,000
  - Between KES 80,001 and KES 120,000
  - Between KES 120,001 and KES 160,000
  - Between KES 160,001 and KES 200,000
  - Between KES 200,001 and KES 240,000
  - Over KES 240,000
  - I prefer not to answer
10. What is the highest level of education you have completed?
- Did not attend school
  - Attended school but did not graduate
  - Graduated from high school
  - Graduated from a polytechnic (certificates, diploma)
  - Bachelor's degree (e.g. BA, BS)

Postgraduate qualification

## **Section B**

**This section seeks to gather information on the specific factors that influence your choice of milk channel. Kindly answer accordingly.**

1. Does your family consume milk?  Yes  No
  
2. What type of milk do you consume?
  - Cow milk
  - Goat milk
  - Camel milk
  
3. How often do you (or family) consume milk in a week?
  - Never
  - Every day
  - A few times a week
  - About once a week
  
4. Which dairy product do you **MOSTLY** consume?
  - Fresh milk
  - Yogurt
  - Cheese
  - Butter
  - Traditional milk (mala)

- UHT/ Long life
- Milk powder
- Ghee
- Other .....

5. **Where do you obtain information about dairy products?**

- Word of mouth communication
- Television
- Radio
- Magazine
- Internet
- Other (Please specify) .....

6. Where do you **PRIMARILY** buy your milk from?

- Milk dispenser
- Mobile milk traders
- Supermarkets
- Small shops & milk bars
- Farmers
- Other (Please specify) .....

7. **On a scale from 1 to 5, 1 being not at all and 5 being very, how likely are you to choose a different outlet?**

1 (not at all) \_ \_ \_ \_ \_ 5 (very)

8. How much do you pay for a litre of milk?

..... KES per ..... litre  Don't know

9. What is your preference between the following?

Processed milk

Unprocessed milk

10. Do you boil milk before consumption?  Yes  No

11. Why do you boil milk?

Hygiene purposes

No refrigerator

Uncertainty about the milk's freshness

Because everybody is doing it

Other (Please specify) .....

12. Do you think milk is safe after boiling?  Yes  No  I don't know

13. Please indicate how strongly you agree or disagree with the following statements?

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Don't know
Milk sellers are concerned about the safety and health of their consumers						



Milk sellers are honest about the safety of milk sold						
Milk sellers have sufficient knowledge and skills to guarantee the safety of milk sold						
Milk sellers always comply with the regulations related to milk safety						
If I were to encounter and problems with milk quality or safety, milk sellers can handle the problems promptly and fairly						

**14.** Have you ever had a severe food-borne illness?

Yes

No

**15. Attitude statements towards purchasing milk;**

I'd now like to know how you feel about purchasing milk.

For each of the following statements please tell me how much you agree with the statement, from strongly agree to strongly disagree.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Don't know
I believe raw milk tastes better						
I prefer packaged milk						
I believe the milk I am consuming is safe						
I believe packed milk is safer for consumption						
I believe packed milk is more expensive than unpacked milk						
I believe packed milk is not healthy						
I believe packed milk contains preservatives						

**16. Perception towards milk outlets:**

**And, now, thinking about when you are purchasing milk, how important to you are each of the following attributes of the outlet that you would buy from?**

	Very important	Important	Neither important nor unimportant	Slightly important	Not important
Is easily accessible to me					
Has consistently low prices for milk					
Milk is safer					
Clean outlet/store					
Offers a wide variety of milk products					
Has a good reputation for selling raw milk					
I am always happy to purchase milk from this type of store					
Milk sold is of higher quality					

17. Please indicate how likely you are to consider the following factors when purchasing milk from an outlet.

	Very important	Important	Neither important nor unimportant	Slightly important	Not important
Price of the milk sold					
Location of the outlet					
Quantity of the milk					
Quality of the milk					
Cleanliness of the outlet					
Influence of friends and associates					
Word of mouth references					

**18. Please indicate if you strongly agree or disagree with these statements:**

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Close family members influence where I purchase milk from					
I think milk bought from my primary source is safe					
The risk of milk going bad is low when I buy milk from my primary source					
Milk bought from my primary source is of good quality					

**I'd like to know more about your use of and views of milk dispensers. Please answer the following question accordingly.**

19. Which of the following options is applicable to you?

(a) I buy milk from a milk dispenser

(b) I used to buy milk from a milk dispenser but I no longer do now

Please explain why.....

© I have never bought milk from a milk dispenser

Please explain why.....

**If you chose option (a) please proceed to question 20**

**If you chose option (b), please proceed to question 21**

**If you chose option (c), please proceed to question 22**

**20. On a scale from 1 to 5, 1 being not at all and 5 being very, how likely are you to recommend others to purchase milk from a dispenser:**

1 (not at all) \_\_\_\_\_ 5 (very)

**21. On a scale from 1 to 5, 1 being not at all and 5 being very, how likely are you to purchase milk again from a dispenser?**

1 (not at all) \_\_\_\_\_ 5 (very)

**22. On a scale from 1 to 5, 1 being not at all and 5 being very, how likely in the future, are you to ever purchase milk from a dispenser?**

1 (not at all) \_\_\_\_\_ 5 (very)

**23. Do you have any comments you would like to make?**

---

**Thank you!**