

**FACTORS INFLUENCING HOUSEHOLDS' ACCESS TO DRINKING WATER: THE  
CASE OF COMMUNITIES IN IMENTI SOUTH, KENYA.**

**BY**

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## DECLARATION

This project is my original work and has not been presented to any other institution for academic examination.

.....

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.....

**Date**

This project has been developed and submitted for examination with my supervision and approval as the university supervisor

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## **DEDICATION**

To my son Ignatius, may this study be an inspiration for you to pursue higher education.

## **ACKNOWLEDGEMENTS**

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## TABLE OF CONTENTS

### Table of Contents

DECLARATION .....	i
DEDICATION .....	ii
ACKNOWLEDGEMENTS .....	iii
TABLE OF CONTENTS .....	iv
CHAPTER ONE .....	4
INTRODUCTION .....	4
1.1 Background to the study .....	4
1.2 Statement of the problem .....	8
1.3 Research Questions .....	9
1.4 Research Objectives .....	9
1.5 Justification of the study .....	10
CHAPTER TWO .....	11
LITERATURE REVIEW .....	11
2.1 Introduction.....	11
2.2 Classification of Water Sources .....	11
2.3 Water sourcing behaviour by households .....	13
2.4 Demographic characteristics of households' and water sourcing .....	15
2.4.1 Gender.....	15
2.4.2 Education .....	17
2.5 Economic characteristics of households' and water sourcing.....	18
2.6 Social characteristics of households' and water sourcing.....	19
2.6.1 Time taken to collect water/ distance.....	19
2.6.2 Household size and composition.....	22
2.7 Risks and perceptions .....	23
CHAPTER THREE .....	26
CONCEPTUAL FRAMEWORK .....	26
3.0 Conceptual Framework.....	26
CHAPTER FOUR.....	29

METHODOLOGY .....	29
4.1 Introduction.....	29
4.2 Research Design.....	29
4.3 Study Site .....	29
4.4 Population and Sampling Procedure .....	30
4.6 Data Analysis .....	32
4.7 Logistical and Ethical Considerations.....	32
CHAPTER FIVE .....	34
STUDY FINDINGS AND DISCUSSIONS .....	34
5.1 Introduction.....	34
5.2 Demographic Characteristics of the Respondents.....	34
5.2.1 Age.....	34
5.2.2 Gender.....	36
5.2.3 Position of the Respondent in the Household .....	37
5.2.4 Marital Status .....	37
5.2.5 Level of Education.....	38
5.3: Economic Characteristics of Households’ and Water Sourcing .....	40
5.3.1 Housing for the Household .....	41
5.4. Water Sources .....	48
5.4.1 Main Drinking Water Source.....	49
5.4.2. Other Sources of Water Used by Households.....	51
<i>Source: Survey Data (2015)</i> .....	54
5.4.3 Water Payment.....	54
5.4.4 Gender and Water Sourcing.....	58
5.4 5 Household Water Allocators.....	60
5.5 Social Characteristics of Households and Water Sourcing.....	61
5.5.1 Time Taken to Collect Water.....	62
5.5.2 Daily Water Collection Frequency .....	63
5.5.3. Quantity of water collected per trip .....	65
5.5.4 Other Activities Performed at the water source .....	66
5.5.5 Effect of Water Sourcing on other Household Activities .....	67
5.5.6 Household Size .....	68

5.6.1 Water safety .....	70
5.6.2 Water treatment.....	73
CHAPTER SIX.....	79
SUMMARY, CONCLUSION AND RECOMMENDATIONS .....	79
6.1 Introduction.....	79
6.2 Summary of the Findings.....	79
6.2.2: Demographic factors influencing water sourcing .....	80
6.3 Conclusion .....	81
REFERENCES .....	82
QUESTIONNAIRE .....	89

## LIST OF TABLES

Table 5.1 No. of People/Occupants in each Age Range in the Three Wards.....	35
Table 5.2 Sex Distribution of the Respondents in the Wards.....	36
Table 5.3 Position of the Respondent in the Household.....	37
Table 5.4 Marital status of the respondent.....	38
Table 5.5 Level of Education.....	40
Table 5.6 Main Type of Residential House and Materials Used.....	41
Table 5.7 Roofing Material for Main House.....	43
Table 5.8 Wall Material for Main House.....	44
Table 5.9 Flooring Material for Main House.....	45
Table 5.10 Income Source.....	46
Table 5.11 Total Household Income.....	48
Table 5.12 Main Source of Drinking Water in each Ward.....	51
Table 5.13 Other Water Sources Accessible to Households.....	52
Table 5.14 Share of Households (%), Sources of Water and Their Use.....	54
Table 5.15 Water Payment by Households.....	56
Table 5.16 Households Water Providers.....	60
Table 5.17 Household Decision Maker on Water Use.....	61
Table 5.18 Time Taken To Fetch Water from Different Water Sources.....	62
Table 5.19 No. of times drinking water is collected daily.....	65
Table 5.20 Effect of Household Activities on fetching water .....	68

Table 5.21 Water Safety.....	71
Table 5.22 Reasons for Water Safety.....	72
Table 5.23 Water Treatment.....	73
Table 5.24 Reasons Behind Water Purification.....	74
Table 5.25 Water Treatment Methods.....	75

**LIST OF FIGURES**

Figure 3.1 Conceptual Framework of the Study.....27

## **ABSTRACT**

*The fact that water is essential for life is indisputable. Favourable advances in many fields have been made in the global community but the basic needs of man; which are clean water and basic sanitation continues to be a mirage. Safe drinking water, sanitation and good hygiene are fundamental to health, survival, growth and development. Several factors influence the access to clean drinking water by households. This study aims at investigating the factors that influence access to clean drinking water by households in Imenti south. The objectives of the study were to investigate the water sourcing behaviour of the households as well as analyse the factors that influence their water sourcing behaviour. Descriptive survey design was used. One sub location was randomly selected from each of the three wards purposively selected for the study. A total of 90 households were randomly selected, 10 from each of the three villages selected from each sub location. Data was collected using questionnaires. Data analysis was done by use of descriptive statistics and presented using frequency tables and charts. The findings show that demographic, economic and social characteristics of a household influence its water sourcing behaviour and access to clean drinking water.*

## CHAPTER ONE

### INTRODUCTION

#### **1.1 Background to the study**

The fact that water is essential for life is indisputable. However, access to safe drinking water is a pressing social policy issue globally, (Spence and Walters 2012). Various international institutions continue holding discussions amongst themselves and producing progress reports on the various issues surrounding water. The World Water Development Report (WWDR), The Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) report and the progress report of the WHO/UNICEF Joint Monitoring Programme for Water and Sanitation (JMP), (WWDR 2014) are some of the reports produced periodically on water. The 2014 United Nations World Water Development Report 4 explores how water can be managed under uncertainty and risk. The United Nations Millennium Development Goal (MDG) 7, target C aims to “reduce by half the proportion of people without sustainable access to safe drinking water” by 2015. This is evidence of how important water is in the world.

The World Water Development Report (2014) emphasizes that ‘water is a critical natural resource upon which all social and economic activities and ecosystem functions depend’. Despite the fact that water is a critical resource, access to it remains a daunting challenge to many people the world over. Although the world met the MDG drinking water target, 748 million people – mostly the poor and marginalized – still lack access to an improved water source and of these, almost a quarter (173 million) rely on untreated surface water, and over 90% live in rural areas, (JMP 2014). The 2014 update report of the World Health Organization (WHO)/United Nations Children’s Fund (UNICEF) Joint Monitoring Programme for Water Supply and Sanitation, (JMP) warned that there was likelihood that 547 million people will not have an improved drinking water supply in 2015 if the then current trends continued. This figure was actually an underestimation as according to WHO (2015) Joint Monitoring and Progress Report 663 million people still lack improved drinking water sources in 2015.

Favourable advances in many fields have been made in the global community but the basic needs of man; which are clean water and basic sanitation continues to be a mirage. Safe drinking water, sanitation and good hygiene are fundamental to health, survival, growth and development. However, these basic necessities are still a luxury for the world's poor. Safe drinking water and basic sanitation are so obviously essential that it becomes a risk if taken for granted. For many in the rural areas, access to clean, safe water and basic sanitation remain a luxury. WHO (2015) report states that eight out of ten people, still without improved drinking water sources, live in the rural areas. Lack of safe and improved water supply and basic sanitation in more than one way inhibits the productivity of the rural people who are mostly farmer (Oyekale and Ogunsanya 2012).

In spite of major gains made by various countries as regards access to drinking water, statistics show that countries in Caucasus and Central Asia, Oceania and Sub Saharan Africa regions are not on track to meet the Millennium Development Goal on water. In Papua New Guinea, only 40 percent of the total population and 33 percent of the rural population have access to an improved source of drinking water, (JMP 2014). This leaves 60 percent of the total population in that country to contend with unimproved sources as their source of drinking water. In Haiti 38 percent of the total population and 53percent of the rural population have no access to an improved source of drinking water while in Yemen, 45 percent of the total population and 53 percent of the rural population has no access to an improved source of drinking water. According to Megerle and Luisa (2013) approximately 36 million people living in rural areas in Latin America and the Caribbean lack even basic access to drinking water and the uneven spatial distribution of the drinking water supply poses a continuous public health risk, results in low economic productivity, low prosperity and thus contributes to the enforcement of regional disparities.

Sub-Saharan Africa is not on track to meet the MDG drinking water target though almost a quarter of the current population (24%) gained access to an improved drinking water source, (JMP 2014). Angola for instance has 46 percent of her total population and 66 percent of her rural population without access to improved drinking water sources while in Mozambique 65 percent and 51 percent of the rural and total population respectively has no access to improved

sources of drinking water. The Democratic Republic of Congo is not any better as 71 percent and 54 percent of the rural and total population respectively use unimproved drinking water. In Nigeria, 36 percent of the population and 51 percent of the rural population has no access to improved water and in Niger, the statistics show that 58 percent of the population living in rural areas and 48 percent of the total population do not have access to improved drinking water sources. The situation in Rwanda, Tanzania Madagascar and Kenya, all in the East Africa Region, is not any different from the other countries whose statistics are given above. In Rwanda, 42 percent of the rural population and 29 percent of the total population use unimproved sources of drinking water while 65 percent of the rural population and 50 percent of the total population in Madagascar drink water from unimproved sources. In the United Republic of Tanzania, 56 percent of the rural population and 47 percent of the total population do not have access to improved sources of drinking water. Kenya has only 62 percent of its total population and 55 percent of the rural population accessing improved water.

Though essential for human life, access to drinking water represents a day to day struggle for hundreds and thousands of citizens who live mainly in developing countries (Herischen, Ruwaida, & Blackburn, 2002 ; Chapitoux, Houssier, Gross, Bouvier, & Brissaud, 2002 ; UN-Water/WWAP, 2006 as quoted by Fotue et al 2012). The above statistics are themselves a testimony to how communities all over the world have problems accessing water for their daily use in spite of the world having met the millennium development goal water target in 2010. According to Bauman (2005) an estimated 35% of rural water supplies in sub-Saharan Africa are non- functional. The challenge for water improvements remains greater for most sub-Saharan African countries, where coverage is mostly below average. Efforts have been made by governments and Non Governmental Organisations with operations in Sub Saharan Africa to get the continent closer to the MDG drinking water target. However a lot still needs to be done.

In Kenya, Water resources underpin the main economic sectors which are agriculture, livestock, tourism, manufacturing and energy (KIPPRA 2013). Important to note is that Kenya was categorized as a water scarce country with per capita renewable water resources of 647 m<sup>3</sup> (Ministry of Water and Irrigation and JICA, 1992) comprising 20,637 m<sup>3</sup> total renewable resource surface water and 619 m<sup>3</sup> ground water. About 50 per cent of the country's water

resources are trans-boundary. These include Lake Victoria, Lake Turkana, Lake Jipe, Mara River, Ewaso Ng'iro South River, and Merti and Kilimanjaro aquifers (KIPPRA 2013).

Increased access to improved drinking water is one of the Millennium Development Goals that Kenya along with other nations worldwide has adopted (United Nations General Assembly 2001). According to the 2009 census report, Kenya has a total of 8 767 954 households. Among these, 5 361 334 of them are rural households while 3 406 620 are urban households. The Report indicates that the main source of water for most households is still borehole/well/spring. There is a further indication that the proportion of households using piped water has been declining since 1989. The proportion of rural households with access to improved water in 2009 was 48 per cent, while in urban areas it was 75 per cent (KIPPRA 2013) These statistics are very worrisome since they reflect slow progress towards the MDG goal of halving, based on the 1990 base year, the proportion of the population without access to safe drinking water by 2015.

According to the Kenya Demographic Health Survey (2010) three out of five households in Kenya (63percent) get drinking water from an improved source. However disparities exist by residence, with a higher proportion of urban households (91percent) having an improved source of drinking water compared with rural households (54percent). The survey results reveal that more than one third (24 percent) of Kenyan households get their drinking water from a non-improved source, mainly surface water from lakes, streams and rivers. Thinking about this percentage, one realises how big the number of Kenyan citizens without clean drinking water is. Although only 6 percent of urban households use non-improved sources for drinking water (Kenya Demographic Health Survey 2010) the proportion is far higher for rural households at 46 percent.

Kenya is divided into several regions namely Nairobi, Western, Eastern, Nyanza, Rift Valley, North Eastern Central and the Coast Region. Water access in Kenya varies in these regions. According to the Kenya population data sheet (2011) 95 .5 percent of households in Nairobi have access to an improved drinking water source. In central and coast, 69.1 and 64.8 percent respectively of the households have access to an improved drinking water source. Nyanza has only 52.7 percent while western has 74.3 percent. Rift valley stands at 57.5 percent and North

Eastern has 69.3 percent of the households accessing an improved source of drinking water. Eastern with 51.1 percent has the lowest percentage of households with access to an improved drinking water source.

Though all the regions have a percentage of their households accessing an improved drinking water source, there are pockets of communities that have very poor access to an improved drinking water source. According to KNBS (2010), the 2009 Kenya National Census shows that only 37% of families in Turkana have access to improved water. There are reports showing that communities in the coastal region have to deal with the challenge of accessing water despite the fact that the longest river in Kenya- River Tana- passes through the region on its way to the Indian Ocean. Citizens living in Nyanza region, though neighbouring the largest fresh water lake- Lake Victoria- have to grapple with the problem of accessing clean drinking water.

Meru County has 59% of its residents using improved sources of water, with the rest relying on unimproved sources (KNBS and SID 2013). Imenti south, which is the area under study, has a total of 47 197 households, 42 793 in the rural areas and 4 404 in the urban areas. The constituency according to KNBS and SID (2013) has the highest share of residents using improved sources of water at 82%. According to the Kenya Census Report (2010) these households have their water sources as follows: 219 of the households use a pond or a dam as the main source of water, 8 use a lake, 7 015 use a stream, 1 991 use either a spring, a well or a borehole, 4 368 have water piped into dwelling, 33,136 use piped water, 42 harvest rain water, 346 buy from a water vendor and 72 households use any other available source. There is therefore a clear indication that access to clean drinking water from an improved source is a big problem.

## **1.2 Statement of the problem**

Imenti South constituency borders Mt. Kenya Forest. The region is endowed with plenty of rainfall. Several Rivers flow through the region enabling people to engage in farming as an economic activity. Besides, tea and coffee, which grow in the highlands, are the main cash crops in the area hence providing financial credibility to the citizens there. It is therefore easy for one to think that people have no problems accessing clean drinking water in the region. This is

because they can easily organize themselves and connect water to their households through tapping it from the many rivers in the region. Statistics show that only 4,368 households in the area have access to piped water into dwelling which is considered the most improved source of drinking water according to the international classifications given by the United Nations. Though the constituency has 82% of its residents using improved sources of water according to (KNBS and SID 2013), there are those residents who have no access to an improved source of drinking water. What then could be the reason for the high statistics of those who have no access to an improved source of drinking water in a constituency considered to be water endowed? Are there factors that could be influencing access to clean drinking water by households in the region and if they exist, what are these factors. This study seeks to answer these questions with the aim of understanding why communities in Imenti South have poor access to clean drinking water.

### **1.3 Research Questions**

The main research question that this study sought to answer is what are the factors that could be influencing access to clean drinking water by households in Imenti South?

- i. What are the water sources accessible to the households in Imenti South?
- ii. How do the households use different sources of water in South Imenti?
- iii. What factors influence water sourcing behaviour of the households in Imenti South?

### **1.4 Research Objectives**

The research objectives of the study were:

- i. Examine the water sources accessible to households in Imenti South
- ii. Investigate the water sourcing practices by the households in Imenti South
- iii. Analyse the factors that influence water sourcing behaviour for the households in Imenti South.

## **1.5 Justification of the study**

Water is an essential resource in the world. It drives not only the social and economic aspects of the globe but also the political ones. The United Nations Millennium Development Goal (MDG) 7, target C aims to “reduce by half the proportion of people without sustainable access to safe drinking water” by 2015. In Kenya the attainment of Vision 2030 is a tall order if majority of Kenyans do not have access to clean drinking water. This is because drinking water from unimproved sources has its dire consequences for instance outbreaks of water borne diseases which will affect not only the productivity of the labour force but also affect their purchasing power. Besides a lot of money which should be channelled towards infrastructural and industrial growth will be directed towards treatment of diseases which would have otherwise been prevented had people accessed clean drinking water.

This study is a contribution to existing knowledge on the many determinants of access to clean drinking water with special interest on rural areas considered to have access to lots of water due to their geographical location yet the residents don't have access to clean drinking water. Understanding the factors that influence the access to clean water by households will help the water policy makers in planning and implementing projects that will ensure that the country's households have access to clean drinking water.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter presents an analysis of the existing relevant literature of the study proposed. The purpose of the study is to establish the factors that could be influencing access to clean drinking water by households. The chapter begins with the classification of various water sources and their common uses followed by the water sourcing behaviour of households. Then the Social - economic characteristics that influence households' access to clean water are analysed. Finally a summary of the studies reviewed concludes the chapter.

#### 2.2 Classification of Water Sources

Water is a very vital resource in the world. According to Esrey (1996), as cited in Whitford et al. (2010), access to safe water and sanitation is crucial in breaking down the barriers and contributing to moving people out of poverty. This is in the sense that access to safe water and sanitation does not only reduce disease burden, but also increases the productivity levels of individuals which consequently reduces poverty through increased incomes and improved health status. He concludes that the two most important linkages between the environment, development, and human health are access to clean drinking water, and the ability of communities to manage wastes through improved sanitation. Datt and Ravillion (1998), Deninger and Okidi (2003) as cited in Garmendia et al. (2004), in their studies in India and Uganda respectively conclude that improvements in infrastructure such as water and sanitation, transportation and telecommunication have great impacts on poverty reduction.

There are various water sources from which life of both fauna and flora is reliant on for survival. According to (UNESCO 2006), the global water resources are not only limited but also unevenly distributed. Clean drinking water is especially important for people's survival. The various water sources from which people around the world get their drinking water are put into categories. According to JMP (2014) there are three major categories namely: (a) piped water on premises,

(b) other improved drinking water sources and (c) unimproved drinking water sources and when looking at water issues the three cannot be ignored.

In the recent past, regional trends in the use of public taps and boreholes and also regional trends in the direct use of surface water as the main drinking water source have emerged. Due to the emergence of these trends the report has factored them into the categorisation of water sources since 2008. Piped water on premises includes piped household connection located inside the user's dwelling, plot or yard; Other improved drinking water sources include public taps or standpipes, boreholes or tube wells, protected dug wells, protected springs, and rainwater collection whereas unimproved drinking water sources include unprotected dug wells, unprotected springs carts with small tank/drum, tanker truck, bottled water and surface water (river, dam, lake, pond, stream, canal, irrigation channels).

Water is an essential component of life, and its availability and quality are crucial. Although domestic water consumption accounts for only 7% of the total water use in Africa (Hinrichsen et al. 1997), the benefits related to an improved water supply, such as effects on health, time savings and high productivity, are quite immense (HDR 2006; Sharma et al. 1996). For a household to fully benefit from an improved water supply, it must have indoor access to safe and reliable water sources. While this is almost always found in developed countries, such access is far from a reality in developing countries, especially in rural areas.

Genuine concerns have been raised about inadequate access to improved water sources. The expansion of access to safe and reliable water sources, especially in Africa and Asia, is therefore one of the "Millennium Development Goals". Access to clean drinking water is one of the most important preconditions for sustainable development. Every country in the world is currently working on ways in which sustainable development can be maintained considering the fact that the world population especially in the developing world is increasing rapidly. One of the numerous current and future critical issues facing Africa, according to Bates *et al.* (2008) and Intergovernmental panel on Climate Change (2001) is water. About 25% of Africa's population currently experience high water stress and countries that do not currently experience water stress will be at risk of water stress in future (Boko *et al.* 2007).

### **2.3 Water sourcing behaviour by households**

The water sourcing behavior by households in different parts of the world and a household's water demand and use according to Onundi and Ashaolu (2014), varies considerably across different domestic settings, including urban, rural and cultural settings as various studies have shown. Water is a vital resource, and the importance of its management, use and allocation cannot be overemphasized. Water is used for domestic, industrial or agricultural purposes, to satisfy human needs and development in a society. In any of these sectors, understanding management, allocation and use behavior is very important to human and social development. Every individual in the society belongs to a unit or subset of the society called a household. He further argues that how and where the water is sourced has a direct relationship on how it is allocated and used within various households. If a household sources water from a source it considers safe, for instance piped water or borehole water, they are likely to use it for drinking and cooking purposes. Therefore, understanding household water use behavior is an important quest to understanding how this resource is sourced, allocated and managed within the household to maximize the use of this vital resource in the face of uncertain future climate and water availability.

Water has many functions as mentioned in the introduction. Different water sources may be used for various functions. The household member tasked with sourcing water may prefer a particular water point due to the fact that it has clean water that can be used for drinking and cooking. In dry areas especially, it is not uncommon to spot community members, washing utensils, and clothes, as well as watering their animals and also taking a bath from one water source. Community members' security as they perform such duties in a water source is key. As much as a water source may be nearer, if the path leading to it is considered insecure, people will shy away from it. Privacy in terms of bushes and meanders are also key when different members of the community have to source their water. If it is common for members to take a bath, then there are normally spots for women children and men. There is a likelihood of having different time frames for visiting the water source also.

A majority of the developing countries, as indicated in the introduction experience serious water problems both in the rural areas and in the urban areas. The urban dwellers most affected are those who live in informal settlements. Because of their meager income, coupled by the fact that

in most cases they are not a priority during planning of resource distribution and service provision by the government, they have to look for ways to access essential resources like water. One way in which households try to satisfy their water supply is by combining two or more sources of water for different uses. There are also challenges in sourcing for water. Onundi and Ashaolu (2014) list some of them as inadequate water points, faulty taps and few boreholes which lead to long queues of people waiting to fetch water hence influencing indoor water use behavior.

Use and demand of water by households has been attributed to an array of factors. Joy et al (2005) attributed the use and demand of water by households to the time taken to collect water, a household's social economic status, the type of house lived in, climate and educational campaign. According to Ayanshola et al (2010) and Mu et al, (1990), time to collect water, income, sex, number of women in a household and price of water are some factors that are attributed to a household's water demand and use while the number of people in a family, the cultural origin, the age of household head and number of rooms per households are the factors that Darr et al., (1975) attributed to the use and demand of water by a household. A lot of literature on water studies that have dealt with access to a drinking water source by households has identified education especially of the household head, household expenditure, gender ratio in the family, size of the family, age of household head as some of the socio economic factors that influence a household's water sourcing behaviour.

Nketiah-Amponsah, et al. (2009) in a study to identify socioeconomic determinants of household source of drinking water in Ghana, used data from a survey conducted in the Districts of Lawra, Dangme West and Ejisu-Juaben where 531 households were interviewed using stratified random sampling technique. The results show that factors such as income, residence (rural or urban), education level of the head and the distance between the residence and water source are some of the factors that influence a household's water sourcing behaviour.

## **2.4 Demographic characteristics of households' and water sourcing**

### **2.4.1 Gender**

Gender according to UNDP (2009) refers to the differences in socially constructed roles and opportunities associated with being a man or a woman and the interactions and social relations between men and women. Crow and Sultana (2002) identified three ways in which gender relations might influence the social relations of water access: gender-based divisions of work, assets or resource ownership and access, and policy discourse and local norms, which may situate economic uses of water and domestic uses in a specific gender domain. According to DFID (2003) the impact of collecting water from traditional sources (particularly during the dry season) takes its toll on the livelihood opportunities of women and girls in particular whereas investment decisions to improve water sources at the household level usually rest with men in their role as household head.

According to the African Water Development Report (AWDR 2006), as quoted in Alaci et al. (2013), in Africa, poor access to water and the attendant water scarcity affect women and girls disproportionately with the situation being worse in rural areas due to institutional and cultural barriers, including those of disparities in rights, decision-making power, tasks and responsibilities over water for productive and domestic activities. GOK (2006) report on water development describes the role of women in domestic water use by noting that they are responsible for ensuring that their families have water for daily living and as a result, when the resource is scarce, they suffer because of their role as domestic water providers, caregivers and household managers.

According to Totoum (2013) gender of the head of the household plays a role among the determinants of household choice of water source. Totoum (2012) suggests that female-headed households are more likely to adopt private tap or collective tap as main water source, compared with male-headed households. Whittington and Briscoe (1990) looked at the gender aspect and explained that women, because they are the ones most frequently collecting water, better understand water quality than other household members who are fetching water much less frequently. A survey carried out in Uganda on the socioeconomic factors' and water source

features' and their effect on household water supply choices in Uganda and the associated environmental impact revealed the same results on the question of who is the main water collector in the household (Prouty 2013).

Mu et al. (1990) using data collected by in-depth personal interviews from 69 households in Ukunda –Kenya found out that the number of women in a household greatly influenced its decision on where to source their drinking water from. Jain and Singh (2010) indicate that with regards to the women, the more time spent in search and collection of water, the lesser the time available to cater for other domestic needs such as cooking, care for children and pursuant of other income-earning activities.

Oyekale and Ogunsanya (2012) reveal that rural households' access to safe water is negatively affected by the sex of the household head. The implication is that male headed households have significantly lower access to portable water. The argument they advance is that women are domestically more inclined towards water fetching. Abebaw et al. (2010) similarly found that in Ethiopia, female headed household have higher probability of having access to improved water sources and one of the reasons adduced was the fact that women and children are directly responsible for fetching water and as heads and decision makers, they may be more inclined to invest in the effort of fetching clean water.

Onundi and Ashaolu (2014), in a study of household water use behaviour in Irepodun Local Government Area of Kwara State, Nigeria on who sources, allocates and uses most indoor water in the households, and for what purpose found out that the people involved in getting water for the various households are female. The study went on to reveal that fetching water for the household had an effect on their time and productivity in that the more time they spent in getting or making water available in their homes the more time they lost in fulfilling other responsibility. Ifabiyi et al. (2010) asserts that women lost considerable productivity time in their quest to make water available for their households. Women possess the power to allocate and determine how and who uses what water in households. In the Kwara state study this is because they are the providers in the first place and if the commodity is misused the burden of providing it lies on them.

### **2.4.2 Education**

The importance of education has been preached the world over and its numerous benefits can not be ignored in all sectors of life. It is no wonder education of households and especially that of household heads is a key determinant in the analysis of a household's water sourcing behaviour. This has been proved by several studies on the determinants of households' choice of water source in Developing Countries, (Madanat and Humplick, 1993; Engel, 2005; Larson et al., 2006, Nauges & Van Den Berg, 2009 quoted in Fotue 2013). Lack of or low level of educational attainment serves as a great barrier to empowerment. Bosch et al (2008), states that the lesser the educational attainment of an individual, the more he or she has limited opportunities to demand better facilities from the authorities as he or she is powerless.

Level of education is believed to play an important role in understanding how safe a water source can be and what measure can be taken to have access to water of good quality. Therefore, the households with more educated occupants strive to source for their households water from the safe sources, unlike those with primary or no formal education who do not really care about how safe the sources of their water is (Onundi and Ashaolu 2014). What this then means is that a household whose education levels are very low, will have problems accessing water whether from improved or unimproved sources as the members will not take their water sourcing habits seriously. This in turn will lead to other complications especially health ones due to poor sanitation. Problems of water access also contribute to poor education of women and children and especially the girl child. Bartlett (2003) attributes this to the fact that the burden of water collection is borne by them. He further points out that in most times the number of hours spent in collecting the water interferes with their school attendance.

UNDP (2006) states that for young girls, the lack of basic water and sanitation services translates into lost opportunities for education and associated opportunities for empowerment. The report further states, that the time burden for collecting and carrying water is one explanation for the very large gender gaps in school attendance in many countries. The report further identifies that Tanzania schools attendance levels are 12% higher in homes 15 minutes or less from a water source that in homes an hour or more away.

Koskei et al. (2013) in their study on the effects of social economic factors on access to improved water sources and basic sanitation in Bomet municipality in Kenya found out that the level of education of household head significantly influenced the type of water source used by households.

## **2.5 Economic characteristics of households' and water sourcing**

The income of a household is a key determinant of the kind of life members will live. It controls several aspects of their lives like the type of housing, education, healthcare, the household will enjoy among other things. Income does influence access to water and the water sourcing behaviour of households in a great way as several studies have shown. Smith and Hanson (2003) established that household income is one of the main determinants of access to water and sanitation facilities. From their study conducted in Cape Town, South Africa, households with lower incomes (below 800 rands) have limited opportunities to improve their water and sanitation conditions.

Bosch et al. (2001) indicate income levels of households as among the factors that determine their access to water and sanitation facilities and services. This is because, the low-income groups are hardly able to afford high connection fees to piped water and hence limit their connectivity. Fotue (2013) in a study on awareness and the demand for improved drinking water source in Cameroon found out that a households wealth index has a statistically significant role in demand for drinking water quality in that households' that are better-off are more likely to consume safe and reliable water. Totouom and Fondo (2012) used the per capita expenditure as proxy for household welfare in their study and their conclusion was that as households become better-off, they are much more likely to choose improved quality water.

Bosch et al. (2000) stated that many poor households have access to lower-quality services than non-poor households. They further claimed that fewer poor households are connected to water networks. Studies have shown that majority of the urban poor who live in the slums are disproportionately underserved (World Bank 2003). In most cases these people are almost never directly connected to the public utility. They not only buy water by the bucket at very high unit

prices but also rely on vending systems, and therefore consume poor quality and little water. Moreover, the benefits of subsidized water accrue primarily to wealthier households connected to public network. Poorer households do not benefit of such subsidies since they have irregular or non-potable water supplies and have to purchase water from other, non-subsidized sources (Fotue 2013).

Mahama (2013) in a study to establish factors which influenced householders' access to improved water and sanitation facilities in five selected low-income communities in Accra found out that income (wealth) statistically influenced the likelihood of access and use of improved drinking water. Kimenyi and Mbaku (1995) acknowledge that economic status of households is closely linked with the affordability of services such as water. Thus households with no reliable source of income are likely to use water from unimproved source.

Koskei et al. (2013) established that the occupation of the household head significantly influenced the type of water source used by household. Their study reviewed that the household expenditure (proxy of household welfare) is the fundamental factor, which compels households to rely on unimproved sources hence the conclusion that authorities should grant special attention to poorer households when implementing strategies for population access to safe and reliable water.

## **2.6 Social characteristics of households' and water sourcing**

### **2.6.1 Time taken to collect water/ distance**

The time taken to walk to a water source and then queuing to fetch the water and getting the water to the household, is really critical when analysing water sourcing behaviour by households. In some cases many hours are spent to collect very few litres of water because either the water points are many kilometres away from the homesteads or they are in a location where a lot of effort and time is required to access them. This is time that could be used in more productive work that would help in improving the lives of a household. UNFPA (2002) report estimated that women in many developing countries walk for an average of about 6 kilometers each day to collect water. The report further states that water collection for domestic purposes is

generally the responsibility of women and children. Women interviewed in the sub-village Vatunau of village Vatuvou in the sub-district of Maubara (Liquiçá, Timorleste) reported that they have to walk for 2 km to get to an open well, or an of four hours a day to fetch 40 liters of water (Tam 2012).

Based on UN (2000) report, the water collection times for villages in Kenya average just over 4 hours per day during the dry season and 2 hours per day during the wet season. The data also indicate times in the range of 4 to 6 hours per day in Botswana, Burkina Faso and Ivory Coast. Inadequate water infrastructure can create multiplier risks in rural areas. Several hours are wasted when women and children spend more time to fetch water for domestic use in walking for long distances to water points. It is not unjustified to therefore state that availability of clean water to households reduces the women's workloads and hours spent in fetching water.

GOK (2006) notes that access to potable water has become increasingly difficult due to changing national policies, increased water scarcity due to pollution, degradation of water resources and changes to methods of water supply. As a result domestic water use in the country especially in rural households has been adversely affected as women and girls spend lots of time walking long distances or queuing to fetch water for use at home. Many times the water is not affordable affecting the domestic water use. This has adversely affected the girl child education and the woman's ability to engage in other income generating activities, cultural and political involvement, rest and recreation.

Mu et al. (1990) using data collected by in-depth personal interviews from 69 households in Ukunda –Kenya found out that household's decisions on where to source their drinking water are influenced by the time it takes to collect water from different sources, the price of water and the number of women in a household. Madanat and Humplick (1993) on extending the work of Mu et al. (1990) by first looking at water usage and secondly analysing households' choice of water sources and connection decisions found out that the distance from the household to the water source impacts negatively on water source choice.

Hindman (2002) conducted a study on household water choice in Philippines on 769 households of Cebu. He analyzed the effects of water prices, taste and household size on the probability to choose a specific water supply source and the results indicate that the time taken to collect water from different sources has a statistically significant effect.

A study by Howard et al (2003) revealed that distance is a crucial factor in determining access to water and sanitation facilities. The further away the source of water is to a household, the lesser the amount of water consumed. For instance, in areas where people walk for more than one kilometre or spend more than 30 minutes for water collection, the per capita water use drops to about five to ten litres per day. Bosch et al. (2008) points out that in the urban areas, a major deterrent factor is not necessarily the distance to the water source but rather the time taken to get water. More people are most likely to reduce consumption of water if they have to walk shorter distances but have to queue for longer hours to draw the water.

Osman and Khan (2011) note that the amount of time involved in getting water is probably more important than the distance covered to the water source as a determinant of access to water. This is due to the fact that some areas are so severely hit by the scarcity of the vital resource (water), that it actually takes a longer time before an individual fetches water than the distance covered to the water source. In a study conducted in Mueda, Mozambique for instance, women spend about two hours to get to a water source and spend about three hours queuing as they wait for their turn to fetch water due to the relative scarcity of available water for the people.

In a study by Mercado and Kjellstorm (2008) to determine the social determinants of health equity in urban settings, it is revealed that the burden of inadequacy of water and sanitation is borne by women and children. Apart from the fact that most of them without toilet facilities in their households have to travel far distances to ease themselves, they also delay their sanitary needs during the day time until night due to modesty and unavailability of water. According to Bartlett (2003), the farther children have to travel to search for water, the more calories they burn and hence have less amount of energy left to undertake other activities in the homes. Further, they are made to carry heavy containers in order to get more water. These can cause some physical deformities and affect the growth of their bones.

Oyekale and Ogunsanya (2012) in their study that analysed the factors influencing households' access to portable water in rural Nigeria found out that as time to get to the water source increases the likelihood of rural households' access to safe drinking water decreases. Onundi and Ashaolu (2014) state that the longer the minutes it takes to source for water, the more rational the use and allocation. For example, a household that spent two hours to get 25 litres of water will be very rational in its usage because of the fear of spending more hours in search of water. The implication is less water will be used and the level of sanitation will be very poor. This then definitely leads to illnesses which take a toll on the households' income as they seek medical attention for the affected family members.

The effort required to fetch water from a source may lead to its preference over another. When a source near the homestead requires one going down a very steep hill to fetch water, and there is a further source which is less strenuous, people will opt to walk for a much longer distance but use less effort and time in getting the water rather than walk for a shorter distance and use a lot of energy in getting the water.

### **2.6.2 Household size and composition**

The number of people in a household determines whether this household obtains its water from an improved source or not (Totoum 2013). Following Keshavarzi et al. (2006) and Froukh (2001), as quoted in Dabbert and Arouna (2009) both household size and composition affect water use. Households with more female members may have more litres of water fetched in a day for their use as opposed to those with more male members. This is because women and girls, particularly in developing countries are associated with water sourcing for it is a societal role bestowed on them. The amount of water used per household is mainly determined by the number of people in it. Large families use more water at the end of the day than smaller families. What this means is that the large households will need to source for more water, even if it is from different sources so as to meet their daily water demand. More so household size has been found to be the most important factor affecting water consumption. Totoum (2012) posits that

household's size has a significant positive effect on household's choice of private tap and negative impact on household's choice of coping sources.

## **2.7 Risks and perceptions**

Generally, human beings are risk averse thus they will always try and look for ways that present the least risk when doing things. Water is essential for human survival as earlier indicated. Having access to clean drinking water is vital for every household and it is for this reason that governments the world over, are grappling with ideas on how to ensure that their citizens have access to clean drinking water. The results of not accessing clean water weigh so heavily on not just individuals but also governments. People have at least some information on the risks involved in drinking contaminated water and their perceptions vary. When a risk is perceived, households take precautionary measures against it. Therefore, when the members of a household make a choice on their drinking water source, they mainly worry about access to and quality of the water. If they doubt the quality due to many factors they may decide to treat the water (Onjala et al. 2013).

Recent literature on risk mainly pays attention to specific environmental issues surrounding the determinants of perceptions of safe drinking water (Doria, 2010, Doria et al., 2005). More specifically, the determinants of perception pertaining to water risks and quality have been identified across many studies (Doria, 2010; Doria et al., 2005; Doria et al., 2009; Griffin and Dunwoody, 2000; Health Canada, 2012a; Jardine, Gibson, and Hrudey, 1999; Jones et al., 2006 as quoted in Spence and Walters 2012). They including: degree of isolation, organoleptics (odours, flavour, colour), water chemicals and microbiological parameters, contextual indicators (state of the household, community, rivers, lakes), past negative health experiences, familiarity and prior experience, impersonal and interpersonal information (acquaintances, friends, family, water companies, media), trust in water companies and other groups, perceived control, demographics, cultural background, and world views.

Onjala et al. (2014) state that different households have different risk perceptions for water from various sources hence each water source has an implicit health risk, which varies depending on the quality of the water as well as the technology required to access the water. They further point out that consumers make judgments concerning the riskiness of different water sources. In their

choice of a main water source, they compare the expected health risk from consuming the specific water to the cost and time use linked to using the water source in question. According to Redding et al. (2000) as quoted in Onjala et al. (2013) health psychologists recognise the perceived risk of illness as one of the most important factors in a household's precautionary behaviours. It is this knowledge, (one can argue) that makes wealthy households buy bottled water for drinking an option which is far-fetched by poor households.

Totoum (2013) posits that literate households seem highly concerned with health risks posed by using contaminated water. In a study that sought to examine the impact of Cameroonian households' awareness about health effects of using contaminated water on their choice of adopting improved water sources the findings suggest that household awareness about health effect of unimproved water, positively affect the decision to rely on improved drinking water source. In the study, those, households who received messages of sensitization (at school or through mass media) in the past took some steps to collect drinking water from improved sources so as to reduce the likelihood of water-borne disease in future. As compare to illiterate headed-household, the higher the households' education, the higher will be the probability of choosing improved drinking water source

Doria (2010) in a study titled 'factors influencing public perception of drinking water quality' found that perception of water quality has a great impact on people's choice of water sources. Doria listed the qualitative variables that influence perception of water quality as: Prior experience with the source, Influence by personal or impersonal information, Sensorial cues like odor, taste, and visual appeal and cultural background and world views. Megerle (2013) found out that the main factors influencing peoples' water quality perception in the rural area of Medellin in Colombia are its colour and appearance, which form a sort of "quality standard" used to evaluate the water quality, even of raw water.

Dupont et al. (2014) in a study in Canada found out that trust in institutions, differences in service satisfaction and the inequity of water supply service as well as loss of control over the water resources and traditional lands all contributed to differences in observed perceptions of drinking water quality. The study was comparing responses to five identical survey questions,

developed independently and distributed to diverse groups of individuals living in Canada to gain an understanding of their beliefs of health risks from tap water and corresponding use of and spending on bottled water.

Level of education according to Onundi and Ashaolu (2014) is believed to play an important role in understanding how safe a water source can be and what measure can be taken to have access to water of good quality. Therefore, the households with more educated occupants strive to source for their households water from the safe sources, unlike those with primary or no formal education who does not really care about how safe the sources of their water is.

## CHAPTER THREE

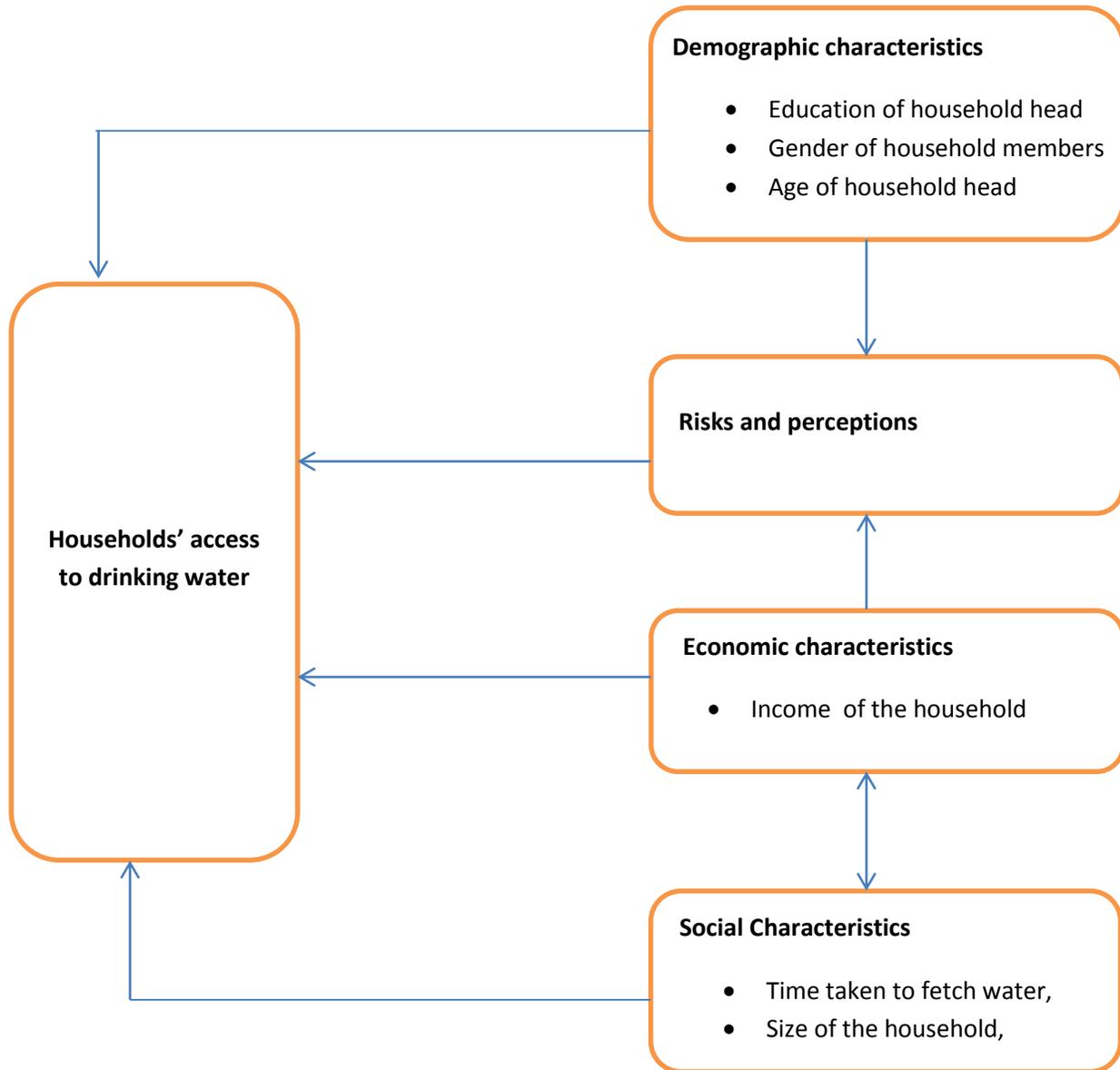
### CONCEPTUAL FRAMEWORK

#### 3.0 Conceptual Framework

The main purpose of this study was to analyse factors that could be influencing access to clean drinking water by households. The demographic, economic and social characteristics of households as well as their risks and perceptions and how they influence access to clean drinking water have been conceptualised as indicated in figure 3.1 below.

The conceptual frame work of this study is shown in figure 3.1. The arrows show the flow through the framework. The relationship between variables is understood by following the arrow from its starting point to the next box and in the case where variables affect each other the arrow points both directions. The first box shows that demographic characteristics influence households' access to drinking water. Literature has shown that households with high literate levels especially of women and the household head, have better access to drinking water as opposed to those without education. Literature also shows that literate households are more aware of the risks involved when drinking water is sourced from unimproved sources and no steps are taken to try and improve the water hence the link between demographic characteristics and the risks and perceptions of households as pertains their source of drinking water.

**Figure 3.1 Conceptual Framework of the study**



**Source: Author 2015**

The risks and perceptions of households are influenced by economic characteristics of the household. In the study economic characteristics are operationalized as household income.

Households with low income may not have access to clean water especially when connection fee is high while this may not be a problem to households whose income are relatively high. On the other hand, Risks and perceptions influence a households' access to drinking water as the arrow from the third box shows. Literature has shown that households' that are more aware of the risks of sourcing water from unimproved sources, and perceive that water to be dirty will not consider those sources for their daily water needs. There is a direct link between economic characteristics and households access to clean water. Literature clearly demonstrates that a households' income is one of the key economic characteristics that influences a households' access to clean drinking water. According to WHO and UNICEF classifications, piped water is considered as an improved source. In most areas, there is always a connection fee charged by water management bodies and studies have shown that the highest numbers of connections is among households' with somewhat high incomes.

Social characteristics like time taken to fetch water and household size and composition affects the income of a household and also influences its access to clean water. Households that have to walk long distances to get to a source of water waste a lot of time that would have otherwise been used in income generating activities by those involved in water sourcing. When the sources of water are far from the household those involved in fetching will settle for the nearest source even when they know that the water is not clean. Social characteristics therefore affect a households' income and its access to clean drinking water negatively.

## **CHAPTER FOUR**

### **METHODOLOGY**

#### **4.1 Introduction**

This section presents the methodology that was employed in the study. A research methodology is very significant in any study as it links theory to practice. The methodology of the current study covers the following issues: the research design, the study site, population and sampling, data sources and data collection methods and finally data analysis procedures.

#### **4.2 Research Design**

According to Kombo and Tromp (2006), a research design is the structure of the study that shows how all the components of a research project relate in addressing the research questions. This study made use of descriptive survey design. This is because descriptive studies according to Mugenda (2008) are used when examining social issues that exist in communities. Access to water is a social issue in every community. Gay (1981) defines descriptive research as a process of collecting data in order to test hypothesis or to answer questions concerning the current status of the subjects in the study.

#### **4.3 Study Site**

The study was carried out in Imenti south, one of the constituencies in Meru County, Kenya. According to the 2009 census report, Imenti South constituency has a total of 47 197 households, 42 793 in the rural areas and 4 404 in the urban areas. The constituency has six wards namely Mitunguu, Igoji East, Igoji West, Abogeta East, Abogeta West and Nkuene. The constituency receives adequate rainfall and it borders Mt. Kenya forest. Agriculturally, the area is favourable for farming with tea and coffee being grown in the upper zones bordering the forest and those farther from the forest being utilized for bananas especially. Other crops like cabbages, carrots, potatoes, maize beans, French beans and horticultural fruits are also planted in the region. The area has several rivers flowing across it originating from the forest. Imenti south has 82% of its residents accessing improved sources of water as shown in the literature reviewed. However there are those who are not accessing clean water and the study aims at understanding why.

#### **4.4 Population and Sampling Procedure**

The population of this study comprised of the residents of Imenti South Constituency. The unit of analysis in the study was the household. The household head was the target respondent. This is because being a patrilineal society, questions on economic characteristics are best answered by the head of the family who in most cases is the man, (unless it's a female headed household). Where he was absent, the wife was interviewed and where both were absent, the son or the daughter, who was old enough to understand the household's water issues was interviewed. The wife and daughter were most helpful in giving information on time taken, gender issues related to accessing water, age and the risks and perceptions involved in the water used by the household for they are more involved in water sourcing than the male members of the households. The study used both probabilistic (random) and non probabilistic (non random) sampling techniques and this was done in two stages as below described.

##### **Stage 1: Sampling of Wards and Sub locations**

As indicated in the study site section, Imenti South constituency has six wards namely Igoji west, Igoji East, Abogeta West, Abogeta East Nkuene and Mitunguu. Igoji west, Abogeta West and Nkuene wards are found on the western side of the constituency. They are wet, with tea and coffee, crops that grow in the highlands as the cash crops. Horticultural crops like cabbages, carrots, French beans among others are also grown in the area. Parts of the Mt. Kenya forest, which is the starting point of the many rivers and streams that flow through the area are found there. Igoji East, Abogeta East and Mitunguu wards are found on the Eastern side of the constituency and they are quite dry since they are far from the forest. Mitunguu ward however has a unique characteristic of having a water project that serves one part of the ward and allows the residents practice farming through irrigation. The project enables farming of bananas, French beans, passion fruits, tomatoes among other crops. Due to the different climatic characteristics of the wards, purposive sampling was used to select one wet and one dry ward to be included in the study. Abogeta East and Abogeta West wards were included in the study as well as Mitunguu ward due to its uniqueness. Considering the limited time and cost that were available for the study, the three wards were chosen due to the easy logistics they afforded the researcher.

Each sampled ward has several sub locations and due to time and cost limitations, only three sub locations, one from each ward, were included in the study. The three were Upper Chure in Abogeta West ward, Mwichiune in Abogeta East ward and Kaurone in Mitunguu ward and Simple random sampling technique was employed in their selection. This eliminated any possible selection bias. According to Mugenda and Mugenda (2003), each of the sub locations has an equal and known non-zero chance of being selected. To get the three sub locations, names of all sub locations in a ward were written in small pieces of paper, folded, put in a container (a ward at a time) and shuffled. The researcher then picked one piece and the name on it was the sub location that was included in the sample. This process was repeated for all the three wards. This way each unit of the population had an equal probability of inclusion in the sample (Bryman 2004).

### **Stage two: Sampling of Villages and Households**

The chiefs of the three sublocations selected were very helpful in identification of the villages in their sub locations. Simple random sampling technique was again applied to get the villages. This was done first by allocating every village in a sub location a number and then writing the numbers in small pieces of paper. These were put in a container, shuffled and then three of them were picked, albeit one at a time. (Shuffling was done every time a number was picked). A total of nine villages were selected. Ten households were sampled systematically from every village to make a sample size of ninety respondents. Different sampling intervals for each village were used depending on the number of households in each village. This was done by getting the names of the households from the village head and selecting every *n*<sup>th</sup> household to get the ten required.

### **4.5 Data Sources and Data Collection**

Field work commenced on Thursday the 11<sup>th</sup> of June and ended on Tuesday 23<sup>rd</sup> June 2015. The researcher collected the data herself and since she understood the local language of the respondents perfectly well, there weren't any language problems encountered. Both primary and secondary sources of data were used. Primary data on factors influencing households' access to drinking water in communities in Imenti South were collected through household surveys. The household head was the target respondent and where not possible to get him, the wife, an adult

daughter or son was interviewed. Questionnaires were used for data collection and the researcher conducted the interviews. At the end of each day of the interviews, the questionnaires were checked to ensure that data was correctly entered and any gaps left were filled. Short notes were written to help in the analysis. Secondary data was obtained from books, government publications, Education journals, discussion papers, theses, institutional reports and working papers. These provided materials for the introduction and literature review section.

### **Pre-test of Data Collection Instruments**

In order to improve validity of the instrument the researcher pre-tested the questionnaires in a pilot study. Orodho (2005) recommends that a population of 10% of the sampled population can be used in a pilot study. Therefore, the researcher conducted a pilot study on nine respondents in a village in upper Kithangari sub location. The responses obtained were used to guide the researcher in making changes in the questionnaire to enhance its validity.

### **4.6 Data Analysis**

Data was analysed using both qualitative and quantitative methods. Since the questionnaire was not coded, the process of data analysis started with data coding of the quantitative questions. Once this was done, data was entered into Statistical Programme for Social Sciences, descriptive statistics were run and frequency tables generated. Data was presented by use of frequency tables and charts and there after explanations of the percentages were given. Qualitative data generated from interviews was organized into themes, categories and patterns pertinent to the study then analysed with the aim of identifying emerging patterns, themes and consistency.

### **4.7 Logistical and Ethical Considerations**

The researcher ensured that there is a finalized proposal and data collection instrument before going to the field for data collection. Before actual data collection commenced in any sub location, the researcher visited the chief's office in order to obtain permission from the chief to visit the selected villages. Confidentiality of information volunteered by the respondents was kept during and after the study. According to Mugenda and Mugenda (2003), lack of confidentiality and mishandling of information provided may cause respondents physical or psychological harm. The principle of voluntary consent was exercised by explaining to the

respondents the aim of the research. No respondent was forced to participate in the exercise. The real purpose of the study which is academic purpose was revealed to the respondents.

### **Challenges Encountered During Data Collection**

The data collection exercise was not without its fair share of challenges. Data collection was done during the cold season and some days heavy showers were experienced. This caused delays in getting to the sampled households as the researcher had to wait for the rain to subside before proceeding with the next interview, an occurrence that had a spillover effect in all other interviews of the day and sometimes the following day too.

The terrain of the study area in some sections also posed as a challenge to the researcher. They are hilly and although the area has a high population density, some sampled households were down the valleys or located on a hill and to get there the researcher had to walk up and down very steep hills and valleys, which were very slippery when it had rained. The worst experience was when the researcher missed some steps down hill and fell.

On the positive side, the respondents were very cooperative and accorded the researcher the much needed time for the interviews.

## CHAPTER FIVE

### STUDY FINDINGS AND DISCUSSIONS

#### 5.1 Introduction

This chapter presents the findings of the field research according to the objectives of the study as outlined in chapter one. The demographic characteristics of the respondents are analysed. These include age, sex, position of the respondent in the household marital status and the academic level of the respondent. Economic characteristics of households, basically their main source of income, and monthly income estimates are analysed. Other household characteristics like the materials used to build the main residential house are also analysed. Social characteristics of the households follow. These include the time taken to collect water and the distance covered and the activities that respondents engage in while at the water source. The effect that water sourcing has on other household activities has also been looked into. The last section represents the findings on the risks and perceptions of the respondents as regards their access to clean drinking water.

#### 5.2 Demographic Characteristics of the Respondents

This section represents the basic characteristics of the respondents as discussed in the methodology section. The household heads were the target respondents and given the patrilineal nature of the society, they happened to be males. However where the male head was not available, the spouse was interviewed and where both were absent, the daughter or son was interviewed. The characteristics of the respondents that were investigated include their age, sex, position in the household and marital status. Studying these attributes of the household head (respondent) is vital for they significantly influence the water sourcing behaviour of households.

##### 5.2.1 Age

Age plays a key role in the use and demand of water by a household as Darr et al., (1975) indicates. The youngest respondent in the study was 18 years and the oldest was 74 years. As shown in table 5. 1 below, 27 of the respondents in the study were aged between 55-64years and they were the majority. 40.7% of them were from Abogeta West, 33.3% from Abogeta East and 25.9% from Mitunguu ward. The study area is majorly a rural set up and people own their farms

where they live with their families. People in this age range mainly have grown up children who have families of their own and live in the farm land. The study observed that in most cases, the respondents were left home with their grandchildren as the other family members went to their working stations. One important observation that the study made is that they were not idle but were working in the part of the farm that is close to the homestead and this is why they were the majority respondents. Being the people at home most of the time meant that they were involved more in water sourcing. This could also mean that they were the majority that decided on the dynamics of water use in the household.

The age range 35-44 had 20 respondents and they were the second highest. 45.0% of them came from Abogeta East while 30.0% were from Mitunguu Ward and 25.0% from Abogeta West. The most possible explanation to this could be that the respondents in this age range had young families with school going children and they needed to spend more time at home taking care of household chores like cooking, taking care of babies and washing clothes. It is likely that the amount of water sourced by households whose respondents came from this age range is more. Table 5.1 below shows age distribution across the three wards.

**Table 5.1: No. of People/Occupants in each Age Range in the Three Wards**

<b>Ward</b>	<b>15-24</b>	<b>25-34</b>	<b>35-44</b>	<b>45-54</b>	<b>55-64</b>	<b>65-74</b>	<b>Total</b>
<b>Abogeta East</b>	1 16.7%	5 29.4%	9 45.0%	5 41.7%	9 33.3%	1 12.3%	30 33.3%
<b>Mitunguu</b>	3 50.0%	7 41.2%	6 30.0%	3 25.0%	7 25.9%	4 50.0%	30 33.3%
<b>Abogeta West</b>	2 33.3%	5 29.4%	5 25.0%	4 33.3%	11 40.7%	3 37.5%	30 33.3%
<b>Total</b>	6 100.0%	17 100.0%	20 100.0%	12 100.0%	27 100.0%	8 100.0%	90 100.0%

*Source: survey data (2015)*

### 5.2.2 Gender

The researcher sought to know the sex of the respondents as sex is an important determinant of households' access to clean drinking water. As shown in table 5.2, out of the ninety respondents interviewed, 54.4% of the respondents were male and 45.6% were female. The survey results indicate that both in Abogeta East and Abogeta West wards, the male respondents were slightly more than their female counterparts at 60.0% and 50.0% respectively. Mitunguu ward however has an equal number of the male and female respondents at 50%. This shows that the male respondents were more than their female counterparts because as earlier explained the target respondents were male heads and their spouses were only interviewed when the males were absent. In case both the father and mother were absent, a son or a daughter, whoever was available was interviewed. Some households were however female headed due to either, death, separation or single parent family and in this case the parent was the mother. These were however very few in number. The study observed that among the respondents, there was no single male parent family and after further probing was done it was established that there were unmarried men who had children. These children however, lived in their grandparents households hence were included in the households decisions.

**Table 5.2 Gender Distribution of the Respondents in the Wards**

Sex	Wards			
	Abogeta East	Mitunguu	Abogeta West	
<b>Male</b>	18	15	16	49
	60.0%	50.0%	53.3%	54.4%
<b>Female</b>	<b>12</b>	<b>15</b>	<b>14</b>	<b>41</b>
	40.0%	50.0%	46.7%	45.6%

*Source: Survey Data (2015)*

### 5.2.3 Position of the Respondent in the Household

The study sought to establish the position of the respondent in the family. It was established that over half of the respondents were fathers at 51%. Mothers followed at 40% while daughters and sons accounted for 6 % and 3% respectively. The study majorly targeted the household head and as earlier indicated, the study area is largely patrilineal and this explains why fathers comprised majority of the respondents as table 5.2 below shows. In cases where the household heads were absent, their spouses were interviewed and as the same table shows, the mothers formed the second largest group of respondents that the study had.

**Table 5.3: Position of the Respondent in the Household**

<b>Position</b>	<b>Frequency</b>	<b>Percent</b>
father	46	51.1
Mother	36	40.0
Son	3	3.3
Daughter	5	5.6
Total	90	100.0

*Source: Survey Data (2015)*

### 5.2.4 Marital Status

The study sought to establish the marital status of the respondents. The study observed that majority of the respondents (61 percent) were married, 36 percent were single and 3 percent were widowed. Those who said they were single were either daughters or sons in the household or

mothers who had children while in their fathers homes but never been married. In some cases this category of the single parents were living with their children in their own houses but in their fathers compounds and they did not have water connections in their households but fetched water from their fathers households. Table 5.3 shows the findings.

**Table 5.4: Marital status of the respondent**

<b>Marital Status</b>	<b>Frequency</b>	<b>Percent</b>
<b>Married</b>	55	61.1
<b>single</b>	32	35.6
<b>widowed</b>	3	3.3
<b>Total</b>	90	100.0

*Source: Survey Data (2015)*

### **5.2.5 Level of Education**

As various studies have indicated, (Madanat and Humplick, 1993; Engel, 2005; Larson et al., 2006, Nauges & Van Den Berg, 2009 quoted in Fotue 2013) the level of education especially of the household head is very vital in influencing access to clean drinking water by households in many parts of the world. This study sought not only to establish the level of education of the household head but that of other persons who were respondents. This is because the literacy levels of the members of a household strongly influence the access to clean drinking water by the household.

The findings showed that majority (32%) of those interviewed had completed secondary school (A Level), 20% had completed primary school while 18 % had at least some primary school education. 9% of the respondents had completed middle level college, 7% had completed university and 3% were secondary school students. 11% of the respondents had no education at

all and these were mainly female respondents who were married and fell in the age category 65-74. All those household heads who had the highest level of education-University completed-were from Mitunguu ward. Those who had completed middle level college and university were mainly employed and operated from their homes to their place of work. Surprisingly, all male respondents were literate for they had attained some level of education. One possible explanation to this is that since the society was a very patrilineal one, education for women in the earlier years was not valued due to the fact that they would get married and have their husbands make most decisions in the home.

From the table, Abogeta East ward has half of its households having attained secondary school education onwards therefore has the highest number at 15. The ward has the least number of those who have no education at all with only two households.

**Table 5.5: Level of Education**

<b>Level of education</b>	<b>Abogeta East</b>	<b>Mitunguu</b>	<b>Abogeta West</b>	<b>Total</b>
Some primary	5 16.7%	5 16.7%	6 20.0%	16 17.8%
Primary completed	8 26.7%	5 16.5%	5 16.5%	18 20.0%
Secondary completed A level	10 33.3%	9 30.0%	10 33.3%	29 32.2%
College(middle level)completed	4 13.3%	1 3.3%	3 10.0%	8 8.9%
University completed	1 3.3%	4 13.3%	1 3.3%	6 6.7%
Secondary ongoing	0 0.0%	2 6.7%	1 3.3%	3 3.3%
None	2 6.7%	4 13.3%	4 13.3%	10 11.1%
<b>Total</b>	<b>30</b> <b>100.0%</b>	<b>30</b> <b>100.0%</b>	<b>30</b> <b>100.0%</b>	<b>90</b> <b>100.0%</b>

*Source: Survey Data (2015)*

### **5.3: Economic Characteristics of Households' and Water Sourcing**

Economic factors of households, literature has shown, do influence the choices and decisions that households make when it comes to water sourcing and access to clean drinking water. This study sought to investigate the economic characteristics of the households in Imenti South and this section represents the findings of the study. The characteristics considered were: type of housing for the household, the type of roofing material, type of floor material and type of wall

material used; the household's main source of income, the total monthly income of the household, and whether the households made any payment for the source(s) of water they used.

### 5.3.1 Housing for the Household

The study was keen to investigate the type of housing the households were living in. Here consideration was given to the main house of the household. It was identified that respondents either lived in permanent or semi-permanent houses as shown in table 5.5.

**Table 5.6 Main Type of Residential House**

			Ward			Total
			Abogeta East	Mitunguu	Abogeta West	
Main type of residential house	Permanent	Count	3	8	6	17
		% within ward	10.0%	26.7%	20.0%	18.9%
	Semi-permanent	Count	27	22	24	73
		% within ward	90.0%	73.3%	80.0%	81.1%
Total	Count	30	30	30	90	
	% within ward	100.0%	100.0%	100.0%	100.0%	

Source: Survey Data (2015)

From the table, 18.9% of the respondents had permanent main houses while 81.1% had semi-permanent main houses. Semi permanent in this study means a house whose foundation and lower part of the walls are constructed using concrete and the upper part of the wall is made of timber. Mitunguu ward had the highest number of the households whose main houses were permanent at 26.7%. The study revealed that the household with the highest level of education, (university completed), came from this ward and during the survey it was observed that all these households had permanent main houses. The results therefore reveal that education level determines the type of housing for a household. Those households with permanent housing, the study revealed, had piped water connected into their premises hence confirming the popular belief that both education level of household members and the type of housing significantly relate to access to water. In this study, the house type had an effect on the sources of water available for the household in that those who had permanent houses, had water connected from

various sources. As it shall be seen in the water sources section, there existed numerous water associations in the study area, and there was no restriction as to how many one could belong to. The only condition was that you adhere by all the decisions made by the association. The study revealed that those who had permanent houses, in most cases were members of two or three water associations and they were keen to ensure that these associations sourced their water from different springs. This as one of the respondents explained, “*was a clever way of ensuring that there was flow of water in the household all year round as all the water associations he belonged to could not disconnect water at once, whether for maintenance or any other reason*”. He however observed that it was a bit expensive as one had to part with a substantial amount of money annually as water payment of whichever kind.

All main houses in the households where the survey was done had iron sheets as their roofing material as shown in table 5.6 These results are a reflection of the 2009 Kenya Population and Housing Census which showed that 96.3% of the households in Imenti South had iron sheets as the main type of roofing material for the main dwelling unit (KNBS 2010). An important revelation that the respondents made, as it shall be seen in the water sources section, was that one of their alternative sources of water for all uses that were studied (cooking, washing clothes, cleaning the house, washing their bodies and domestic farming) was rain water. This is possible because of the iron sheets roofed houses as shown by the table. This affected the water sourcing behaviour of the households seasonally. The respondents explained that during the dry seasons, rain water harvesting was not possible and they all sourced water from other sources for they did not have tanks big enough to store rain water for use during the dry seasons. However during the rainy seasons, the iron sheet roofing came in handy as households harvested rain water for daily use. Despite the fact that they did not have big storage tanks, the *sufurias* (*cooking pots*) and small tanks they used provided enough water for household use. This, the study established, significantly reduced the time they spent sourcing for water in either springs, river or neighbours compounds. In turn, the disagreements that were caused by water sourcing significantly reduced during the rainy seasons.

**Table 5.7 Roofing Material for the main House**

			Ward			Total
			Abogeta East	Mitunguu	Abogeta West	
<b>Roofing material</b>	<b>Iron sheets</b>	Count	30	30	30	90
		% within ward	100.0%	100.0%	100.0%	100.0%
<b>Total</b>		Count	30	30	30	90
		% within ward	100.0%	100.0%	100.0%	100.0%

Source: Survey Data (2015)

On the type of wall materials used in house construction, 63.3% of the main houses had wood as their wall material. These findings agree with those of the 2009 Kenya population and Housing Census (KNBS 2010) which found out that 63.4 % of the households in Imenti South had wood as the wall material for the main dwelling unit. The current survey results indicate that 36.7% of the households had concrete as the wall type for main house, showing a deviation from the census report which indicates that only 19.9% of the main dwelling units wall material was wood. Abogeta East ward had the highest number of households whose wall material was wood at 76.7% and Mitunguu ward had the highest number of households whose main house wall material was concrete at 53.3%.

The study however made an important observation that these two types of wall materials were majorly used together such that the foundation and the lower part of the wall was made of concrete and the upper part was wooden. One possible explanation to this is the availability of trees for timber splitting in the area. Another possible explanation could be the lower cost associated with construction of a semi permanent house as compared to a permanent one.

**Table 5.8 Wall Material for Main House**

		Ward			Total	
		Abogeta East	Mitunguu	Abogeta West		
Wall material	wood	Count	23	14	20	57
		% within ward	76.7%	46.7%	66.7%	63.3%
	concrete	Count	7	16	10	33
		% within ward	23.3%	53.3%	33.3%	36.7%
Total		Count	30	30	30	90
		% within ward	100.0%	100.0%	100.0%	100.0%

Source: Survey Data (2015)

The study also investigated the flooring materials of households main houses and the results revealed that in the study area, cement, earth and tiles were the main types of flooring materials used. 52.2% of the houses had cemented floors while 44.4 % had earthen ones. Tiles accounted for 3.3% of the materials that the floors were made of. Abogeta East ward had 60.0% of cemented floors and the explanation that was given by the respondents is that sand harvesting was done in the neighbouring constituency and therefore the cost of transportation was not very high hence having a cemented floor was not very hard. This is because after selling bananas, one could have sand delivered at home and during the next harvest, cementing would be done.

Across the three wards under study there were those respondents who reported that though their houses had earthen floors, they were in the process of cementing them and they showed the materials they had bought in preparation for the same and that they were awaiting proceeds from their next harvest to commence the work, (see Table 5.8).

**Table 5.9 Flooring Material**

		Ward			Total	
		Abogeta East	Mitunguu	Abogeta West		
Type of Floor	earth	Count	12	13	15	40
		% within ward	40.0%	43.3%	50.0%	44.4%
	cement	Count	18	15	14	47
		% within ward	60.0%	50.0%	46.7%	52.2%
	tiles	Count	0	2	1	3
		% within ward	0.0%	6.7%	3.3%	3.3%
Total	Count	30	30	30	90	
	% within ward	100.0%	100.0%	100.0%	100.0%	

**Source: Survey Data (2015)**

### 5.3.2 Households Main Source of Income

Households were asked to state their main source of income. Findings indicate that majority (62.2%) of the households, had farming as their main source of income. Respondents from Abogeta West ward mentioned proceeds from tea farming as the ones they used for paying fees, buying food, catering for their medical bills among other uses while those from Abogeta East and Mitunguu mentioned banana farming. Majority of those who mentioned farming were households from Mitunguu at 66.7% followed by Abogeta west with 63.3%. 22.2 % of the respondents were self employed. The study revealed that they engaged in various activities like masonry, hairdressing, carpentry, tailoring and selling in their small shops to get income. Those employed and those who got their income from offering casual labour mostly in their neighbours farms accounted for 7.8% of the respondents each. Table 5.10 has the findings. All those who offered casual labour, the study revealed, did not have water connection in their households. They fetched water for drinking and other uses from their neighbour's households. This was a source of conflict for households especially during the dry seasons when water was not enough especially for irrigation. The farmers, owing to the fact that they required water for their crops, preferred connecting water to their households from where they installed several

standpipes in the farms to aid irrigation. The study established that they did not just connect water from any other spring or river. They considered those with high water volumes that could serve them well, a factor that those who were not farmers did take into account so much.

### 5.10 Main Source of Income per Ward

			Ward			Total
			Abogeta East	Mitunguu	Abogeta West	
Household's main source of income	Farming	Count	17	20	19	56
		% within ward	56.7%	66.7%	63.3%	62.2%
	Self employed	Count	8	7	5	20
		% within ward	26.7%	23.3%	16.7%	22.2%
	Employed	Count	3	1	3	7
		% within ward	10.0%	3.3%	10.0%	7.8%
	Casual laborer	Count	2	2	3	7
		% within ward	6.7%	6.7%	10.0%	7.8%
	Total	Count	30	30	30	90
		% within ward	100.0%	100.0%	100.0%	100.0%

Source: Survey Data (2015)

### 5.3.3. Household Income Level

Households were asked to estimate their monthly total income. This is because income is a major determinant of a household's access to clean drinking water. As indicated in table 5.11, over half of the respondents (60.0%) stated that their total monthly income was KShs 10000 or less followed by 30.0% who reported having a total monthly income of between KShs 10001-20000. 5.6 % of the respondents stated their household monthly income to be KShs 40001-50000 while 2.2% had their monthly income in the KShs 20001-30000 category and another 2.2% of the respondents reported to have a total monthly income of KShs 50000 and above.

63.3% of the households with a monthly income below KShs10000 were from Mitunguu ward, followed by Abogeta East at 60.0% and then Abogeta west at 56.7%. As earlier mentioned, Mitunguu was the driest of the three wards and households here relied on irrigation water which they paid for as will be seen later. The water was not enough for their farming needs and when the water levels in the river went down especially during the dry seasons, it affected crops and the yields at the end of the season were not as good as those from other wards.

These respondents whose total monthly income was above 40000 KShs, the study revealed, were either employed, had big farms where they practised intense farming or combined the two sources of income. The study also revealed that those households who reported to not having piped water in their premises had a total monthly income of KShs 10 000 and below. This could be possibly explained by the high water connection fee that was payable to the water associations that ranged between 70 000KShs to over 300 000KShs as some respondents mentioned. It was definitely very difficult for them to raise this kind of money and even when one started the contributions, they stopped along the way due to discouragement by the huge sums of money involved.

**Table 5.11: Total Household Income**

			Ward			Total
			Abogeta East	Mitunguu	Abogeta West	
Household's monthly income	0-10000	Count	18	19	17	54
		% within ward	60.0%	63.3%	56.7%	60.0%
	10001-20000	Count	9	8	10	27
		% within ward	30.0%	26.7%	33.3%	30.0%
	20001-30000	Count	0	1	1	2
		% within ward	0.0%	3.3%	3.3%	2.2%
	40001-50000	Count	2	1	2	5
		% within ward	6.7%	3.3%	6.7%	5.6%
	50000 and above	Count	1	1	0	2
		% within ward	3.3%	3.3%	0.0%	2.2%
Total	Count	30	30	30	90	
	% within ward	100.0%	100.0%	100.0%	100.0%	

*Source: Survey Data, (2015)*

#### **5.4. Water Sources**

There are several water sources the world over as indicated in the literature review section. Households' source their water from the ones available to them. In this study, access to a water source does not necessarily mean that the household is connected to it but rather there is a water source in the neighbourhood that is accessible to it. One of the objectives of this study was to establish the water sources available in Imenti South. The survey revealed that no single household has just one source of water supply. The major sources of water supply in the research area, the survey established, are piped water into dwelling, piped water into yard, rain water,

unprotected springs, protected springs and surface water. These sources were available and accessed by households in the three wards studied. However their accessibility and use in the different villages in the wards varied.

#### **5.4.1 Main Drinking Water Source**

The study was interested in establishing the main drinking water sources that households in Imenti south had access to and used. To do this, the respondents were asked what their main source of drinking water was and options were read out to them (see questionnaire for the options). Respondents in the study area, mentioned piped water into dwelling, piped water into yard/plot and protected dug well as their households main source of drinking water. As will be seen in the next section of other sources of water available to the households, rain and surface water were greatly mentioned by the households. However these two sources did not make to be the main sources of drinking water by the households.

Cross tabulation results on the question on the households main source of drinking water and the wards indicated that on average, 82.2% of the respondents had piped water into dwelling as their main source of water. These findings agree with those of KNBS and SID (2013) that Imenti South constituency has the highest share of residents using improved sources of water at 82%. As shown on the table below, both Abogeta East and Abogeta West wards had 86.7% of their households accessing piped water into dwelling while 73.3% were in Mitunguu Ward. 16.7% mentioned piped water into plot/yard as their main source of drinking water with 23.3 % being residents of Mitunguu ward while Abogeta East and Abogeta West wards having 13.3% of the respondents each. The reason for this small percentage of households having their main drinking water source as piped water into yard may be because the survey was largely carried out in the rural areas of the wards where people live in their own homes in their farms. It is not common to find rooms for rent in rural areas and the few who rented, were actually not originally from that village. In this study, rooms for rent were not necessarily found in the urban areas. Farm owners had built small rooms near the road and these are the ones that they rented out. It is these rooms that were adjacent to each other and had a fence around them for security purposes that this study considered as a plot/yard.

Only 1.1 % mentioned protected dug well as their main source of drinking water and they were from Mitunguu ward. However of those whose main source of drinking water was piped water into dwelling, a good number did not have water in their households but fetched from their neighbours. The study sought to find out the reason behind some households not having water connection in their households yet their neighbours had. It was established that majority of those households had several factors that hindered them from having their own water connection. The reasons mentioned included: little income, misuse of the little household income mainly by the household head, high water connection fee that was unaffordable, lack of trust in the management of the water associations and also availability of water in the neighbourhood. Since the area is densely populated, people have small pieces of land and the homesteads are close to each other hence getting water from the neighbours was not a problem unless there existed misunderstandings between neighbours that would hinder them from sharing the water source.

The study established that in many cases, the household head being the main recipient of household farm yields proceeds either from tea, bananas or even milk payment, would waste all of it in alcohol drinking dens. The area of study being a patrilineal one, it was difficult for the women to plan for the money, manage its use or question how it was used. However they did not like visiting their neighbours homes so often to fetch water as these visits, they reported, in many times resulted to misunderstandings. The excerpts below illustrate the depth of women's concern on fetching water from the neighbours and how uncomfortable they were with income misuse:

*“I really don't like this business of visiting my neighbours every now and then in search of water because on many occasions I have had misunderstandings with them. Sometimes when somebody prepares his land, he tells you not to step on his crops and others go to the extent of closing the path that we use to get water using twigs. As a grownup woman, I know my presence is not welcome but I play it down since I have nothing to do”, (respondent 64 June 17<sup>th</sup> 2015)*

Another respondent said:

*“I wish my husband would allow me participate in managing the little money we get. Surely I would have water connected to my compound just like my neighbours. The problem with him is that once we get money from banana sales, he disappears for a week. All I hear is that he is seen*

drinking in town. He only comes back home when the money is over and when I try telling him to pay for water connection, his answer is that I will not teach him on how to spend his money”, (respondent 77, June 19<sup>th</sup> 2015).

**Table 5.12 Main Source of Drinking Water in each Ward**

			Wards			Total
			Abogeta East	Mitunguu	Abogeta West	
<b>Household’s main source of drinking water</b>	Piped water into dwelling	Count	26	22	26	74
		% within ward	86.7%	73.3%	86.7%	82.2%
	piped into yard/plot	Count	4	7	4	15
		% within ward	13.3%	23.3%	13.3%	16.7%
	protected dug wells	Count	0	1	0	1
		% within ward	0.0%	3.3%	0.0%	1.1%
Total	Count	30	30	30	90	
	% within ward	100.0%	100.0%	100.0%	100.0%	

Source: Survey Data (2015)

#### 5.4.2. Other Sources of Water Used by Households

Respondents answered the question on whether they had other sources of water that was accessed by their households to the affirmative. All of them reported that their households used water from other sources. These sources are protected springs, unprotected springs, rain water and surface water from rivers. On average, 18.9% of the households indicated that they used protected springs as their other source of water. 33.3% of these were from Abogeta East, 10.0% from Mitunguu and 13.3% from Abogeta West ward. Rain water was the source that was mentioned by majority of the respondents as the other source of water that was used by the households at 58.9% on the average. It was used by 73.3% of the households in Abogeta west, followed by 53.3% in Mitunguu and 50.0% in Abogeta East. 15.6% of the households reported that surface water was their other source of water with Mitunguu households having 26.7%, followed by Abogeta East at 13.3% and Abogeta West at 6.7%. Mitunguu ward had a relatively

large number of households relying on surface water because it was relatively dry as compared to the other wards and piped water into dwelling was quite expensive for the residents to connect.

Unprotected springs were the least mentioned as the other source of water by households with an average of 6.7% and Mitunguu having 10.0% of its households using them. One reason why every respondent mentioned rain water as their other source can be associated with the fact that all household had iron sheets as the roof material for their main houses.

**Table 5.13: Other Water Sources Accessible to Households**

Other sources	Wards			Total
	Abogeta East	Mitunguu	Abogeta West	
<b>protected springs</b>	33.3%	10.0%	13.3%	<b>18.9%</b>
<b>Rain water</b>	50.0%	53.3%	73.3%	<b>58.9%</b>
<b>unprotected springs</b>	3.3%	10.0%	6.7%	<b>6.7%</b>
<b>surface water</b>	13.3%	26.7%	6.7%	<b>15.6%</b>

*Source: Survey Data (2015)*

The study further sought to establish the main and alternative sources of water used for various uses in the household. These were drinking, cooking, washing clothes, house cleaning bathing or washing bodies and domestic agriculture. The findings indicated that piped water into dwelling and piped water into ward, both of which are improved sources of water, were the main source for all the above mentioned uses with the former being used by an average of 94.4% of all the households surveyed. 96.7% of these households were from Abogeta West ward while Mitunguu and Abogeta west, had 93.3% each of the households which used piped water into dwelling as their main source of water for drinking and other aforementioned uses.

The alternative sources of water were rain , protected springs, unprotected springs and surface water mainly from the rivers. The various sources were used in different combinations in the three wards. In all the three wards where the study was carried out, rain water was the most available alternative source of water. On average, 75.6% of households indicated that they used rain water for cooking and washing clothes and 80.0% of them were from Mitunguu ward whereas Abogeta east and Abogeta West Ward had 73.3% of the households using it for the same purpose each. A further 79.2% of the households averagely, used rain water as their alternative source for cleaning their houses with 83.3% of them in Mitunguu and 80.0% from Abogeta West and 73.9% from Abogeta East. For bathing, 74.5% of the households on average, said that they used rain water as their alternative source where 77.8% were from Mitunguu Ward, 75.0% from Abogeta West and 69.2% from Abogeta East.

This study however did not have a question capturing the weather seasons. Hence the fact that majority of the households indicated that rain water was their most widely used alternative source of water, it was mostly sourced during the rainy season and since people did not have big storage tanks in their homesteads, the source would only be utilized during the rainy season. Infact the study revealed that rain water would be harvested using sufurias (cooking pots), wash basins and small tanks of 100 litres (when available) and it would be put into immediate use.

Besides rain water, unprotected springs at 14.4 % on average, were mentioned by households to be the other alternative source of water for cooking and washing clothes whereas house cleaning took 18.1 % and bathing 19.1 % in all the wards. From the table, unprotected spring came second as the alternative source of water, followed by the protected springs and surface water, was the least mentioned as an alternative source for all the above uses. In all the three wards, no household used surface water as their alternative source for house cleaning. A possible explanation to this could be that this particular use was not such an important one during periods of water scarcity and respondents could not tire themselves going down the valley to carry water from the river, for house cleaning.

**Table 5.14 Share of Households (%), Sources of Water and Their Use**

Uses	Wards and water sources						
	Wards	Main		Alternative			
		Piped into dwelling (%)	Piped into yard (%)	Protected spring (%)	Rain (%)	Unprotected spring (%)	Surface (%)
<b>Cooking/washing clothes</b>	Abogeta East	96.7	3.3	6.7	73.3	16.7	3.3
	Mitunguu	93.3	6.7	0	80.0	13.3	6.7
	Abogeta West	93.3	6.7	6.7	73.3	13.3	6.7
	<b>Whole sample</b>	<b>94.4</b>	<b>5.6</b>	<b>4.4</b>	<b>75.6</b>	<b>14.4</b>	<b>5.6</b>
<b>House cleaning</b>	Abogeta East	96.7	3.3	4.3	73.9	21.7	
	Mitunguu	93.3	6.7	0.0	83.3	16.7	
	Abogeta West	93.3	6.7	4.0	80.0	16.0	
	<b>Whole sample</b>	<b>94.2</b>	<b>5.6</b>	<b>2.8</b>	<b>79.2</b>	<b>18.1</b>	
<b>Bathing</b>	Abogeta east	96.7	3.3	7.7	69.2	23.1	0.0
	Mitunguu	93.3	6.7	0.0	77.8	16.7	5.6
	Abogeta west	93.3	6.7	6.2	75.0	18.8	0.0
	<b>Whole sample</b>	<b>94.2</b>	<b>5.6</b>	<b>4.3</b>	<b>74.5</b>	<b>19.1</b>	<b>2.1</b>

*Source: Survey Data (2015)*

### **5.4.3 Water Payment**

This study sought to establish whether respondents made any monetary payments for the water they used in their households and if they did how often, the amount that they paid and for what purpose. There were various responses to these questions by the households. This was so due to the different characteristics of the wards in regard to water sources. For instance, Abogeta west which borders Mt. Kenya forest is more endowed with the water resources due to the many

permanent streams that flow through the ward downwards to the other wards where they merge and form one big river.

The results show that all households in Abogeta East and Mitunguu wards, paid for the water while in Abogeta West, only 26.7% of the households reported to be making some water payments. This was so because, as indicated in the study area section, both Abogeta East and Mitunguu wards are found in the dry parts of the constituency. In Mitunguu ward, respondents reported to source their drinking water from two main piped sources. i) An irrigation scheme water and ii) municipal council water project. The study revealed that these two water sources were paid for. The payments for the two were different as was the management. The irrigation scheme water, the study revealed was better managed as the local population had taken charge after the initial funders, the Canadians, left. The project was still in operation and at the time of the study it was the only main source of not only drinking water but water for other uses also. On enquiring on what happened to the municipal water, the survey established that it was no longer operating. The reasons for its stalling, the survey revealed was due to poor management systems and misappropriation of the funds that the members paid. This, households explained, led to water being disconnected despite the fact that they always paid their bills because there was no proper records system.

**Table 5.15: Water Payment by Households (%)**

	<b>Response</b>	<b>Abogeta east</b>	<b>Mitunguu</b>	<b>Abogeta west</b>
<b>Payment</b>	<b>Yes</b>	100	100	26.7
<b>How often</b>	<b>Monthly</b>	53.3	46.7	0.0
	<b>Annually</b>	46.7	53.3	100
<b>Amount</b>	<b>0-100</b>	43.3	33.3	0.0
	<b>101-200</b>	10.0	10.0	0.0
	<b>201-300</b>			
	<b>300 and above</b>	46.7	56.7	100.0
<b>Use</b>	<b>Maintenance</b>	43.3	40.0	62.5
	<b>Paying technicians</b>	20.0	36.7	37.5
	<b>Connection fee</b>	36.7	23.3	0.0

*Source: Survey Data (2015)*

On being asked how often they paid for the water, varied responses were given. The results revealed that water payment was either done monthly or annually. As the table shows, 53.3% of those who reported to be paying for water monthly were households in Abogeta East while 46.7 were from Mitunguu. Abogeta West had no household making monthly water payments. The explanation given is that the few (26.7%) who made water payments, all paid annually and that they were connected to a recent water project initiated by the local Catholic Church and therefore were making contributions either for connection, or maintenance of the project. In Mitunguu, the 53.3% who made annual payments, a households acreage was the determining factor. The more the acres of land under cultivation, the more one paid. This amount was paid for the Canadian government sponsored irrigation water project. All households that paid for water annually paid more than 300KShs. All those households in Abogeta West that reported making water payments, not only paid annually but also paid more than 300 KShs.

The study further established that apart from the compulsory monthly and annual payments, some respondents revealed that sometimes they paid extra money for expansion of their water

projects. This expansion happened on the realization that the water volume was not enough especially for farming. This was not an annual occurrence. It took several years for them to plan and buy bigger pipes in order to have more water flowing to their households. This expansion however varied from project to project as there were several small water associations in the areas. One major finding that the survey made is that there was no restriction on how many water projects a household could belong to. Therefore, a household could belong to several of them as long as they cooperated and agreed to all the demands and decisions of the different associations they belonged to. The major challenge that the multi membership caused was the lack of commitment to the different associations by the member household. It was difficult to attend called for by the associations as they were held on various days and timings. However, whenever there was a wave of water meetings in the wards, they happened within the same period. The study established that this multi membership was a major cause of downfall and non operation of many associations.

The study also sought to find out what the money paid by households was used for. There were several responses to this. It was established that, water pipes and intake tanks maintenance, payment of the technicians and connection fee were the main uses of the money. Maintenance fee, the study revealed, was the main reason the payments were done and this cut across the three wards studied. Abogeta West ward had 62.5% of the households reporting that the money they paid was for maintenance, while Abogeta East and Mitunguu wards following each other very closely at 43.3% and 40.0% respectively. Connection fee and paying of the technicians that were taxed with repairing leaking pipes and intake tanks were the other uses mentioned for the money paid and their percentage distribution across the wards is as shown in the water payments table. Expansion was also a reason why households made water payments but this was not done regularly but only when deemed necessary. This expansion included buying of a bigger pipe for tapping water from the intake upstream.

On the amount that was paid by households for water, there existed several water associations in all the three wards where the study was carried out as noted in the previous section. Due to this, member households paid different amounts of money to their various associations as agreed during the meetings. Those households that belonged to more than one association were

therefore required to pay whatever amounts deemed convenient by their various associations. This in many cases slowed down the growth and operation of the associations because of the delay in paying the agreed amounts. The least amount of money paid however by households in any association was 50KShs and the highest was 5000kshs which in most cases was part of expansion or connection fee and was payable in instalments.

The survey revealed that Abogeta West ward had very minimal complains about the water they paid for. This can be attributed to the fact that they made their payments annually as it can be seen from the table above. This annual payment, one respondent pointed out, helped in better proper management of the church sponsored water project and anytime leakages occurred on the pipes, they were detected and repaired within the shortest time possible as there was no fund mobilization required from the members.

The study further established that Mitunguu ward had the highest number of ad hoc water association meetings and that the frequency of contribution was highest in this ward. What was not clear, the respondents reported, was how their money was being utilized. They reported that every time they held a meeting, there was an amount of money that they were told to pay yet they did not see the work that the money did. Many had therefore decided to discontinue the ad hoc payments and this had led to their water being disconnected by the management of their associations. This affected water sourcing in the area in that many households whose water was discontinued, turned to fetching water from their neighbours, something that was a constant cause of conflict in the village or went to the river which was far, and therefore more time and energy was used in water fetching, which would have otherwise been used for a more economically viable activity.

#### **5.4.4 Gender and Water Sourcing**

The study was interested in knowing how gender played a role in water sourcing behaviour in Imenti South. According to Totoum (2013) gender of the head of the household plays a role among the determinants of household choice of water source. The question, who usually goes to the source to fetch the water for your household was asked. The study observed that adult females bore the biggest responsibility of fetching water for their households in all the three

wards with an average of 66.7%. The female children followed with an average of 16.7 % in water sourcing and this happened even when there was piped water into their premises. On average, only 8.9% of the respondents said that adult males were responsible for sourcing water for their households and 7.8% mentioned male child. Therefore, the total number of females involved in providing water for households is significantly greater than males. In the sampled 90 households, it was discovered that females provided water in 75 (83.4%) households while male only provided water in 15 (16.3.33%) households. These results agree with those of Onundi and Ashaolu (2014), who in their study on households water use behaviour in Irepodun Local government area of Kwara state, Nigeria, found out that the total number of females involved in providing water for households was significantly greater than males and that in the sampled 330 households, it was discovered that females provided water in 253 (76.67%) households within all categories of household type.

In the current study, the explanation given to this occurrence by both the male and female respondents is that women are the ones involved with many household chores like washing clothes, cleaning the house, cooking, washing utensils and most importantly boiling bathing water for other family members. The excerpt below illustrates the depth with which women were considered water providers:

*“Since my ancestors time, men don’t enter the kitchen in our area. It is a taboo and when you do so, you are regarded as not being man enough. After all I married so that my wife would take care of me. If I am then to fetch water, why should I keep her in my house?” (Respondent 37, June 15<sup>th</sup> 2015).*

Another possible explanation could be that majority of the women were not employed and hence worked in their farms save for the times they offered their services as casual labourers in their neighbours farms for a fee. In households where the adult male sourced water, the study found out that in most cases the wife was either expecting a baby, nursing a small child or the adult female was an old lady and the age combined with deteriorating health could not manage carrying water.

Contrary to the common findings in water studies that females are key water providers in all areas, this study negated that in both Abogeta East and Abogeta West wards. In Abogeta West, the adult male provided water in 13.3% of the households. On probing further, it was discovered that culture played a role. There is a general assumption in Imenti south that men don't do household chores as the excerpt above illustrates. However this belief has slowly been fading off and in some areas, the rate at which this is happening is faster. It is for this reason that some men in this ward did not see anything wrong in fetching water for their household.

In Abogeta West, the male child occupied 10.0% in sourcing water for the household. The researcher asked the reason why the male child was also involved in fetching water in the area. The respondents observed that it was a deliberate step that parents were taking to involve the male child in household activities in an effort of making them more responsible men in future. The respondents reported that there was a major change that was being observed in the young men in the area once they got married. They did not value family life, neither did they support their equally young wives in the way that was expected of them. Hence the decision to start engaging them early enough in a bid to show them that there was nothing wrong in giving a helping hand in the home.

**Table 5.16: Households Water Providers**

Person responsible	Ward			
	Abogeta East (%)	Mitunguu (%)	Abogeta West (%)	Total (%)
<b>Adult male</b>	13.3	6.7	6.7	<b>8.9</b>
<b>Adult female</b>	63.3	66.7	70.0	<b>66.7</b>
<b>Male child</b>	6.7	6.7	10.0	<b>7.8</b>
<b>Female child</b>	16.7	20.0	13.3	<b>16.7</b>

Source: Survey Data (2015)

#### **5.4 5 Household Water Allocators**

When water is sourced for household use, some groups of people have an overriding power on how it is used and for what purpose as clearly stated by Onundi and Ashaolu (2014). This study sought to establish who decides on how the water sourced for households use is allocated and the responses given were varied.

The study results revealed that wives at 76.7% on average were the key decision makers on how water was to be used in the household. This happened even where the water was sourced by the female child, male child or male adult. 12.2% of the respondents indicated that anybody in the household could decide how the water was used. After further probing, it was revealed that changes were clearly observed during the dry seasons when the female gender strongly took the lead in deciding how the water was used. This could be because they bore the task of sourcing for the commodity. This result is in agreement with that of Onundi and Ashaolu (2014) in Nigeria and it is hence concluded that females are the principal actors in household water use/management.

**Table 5.17: Household Decision Maker on Water Use**

Decision maker	Wards			
	Abogeta east	Mitunguu	Abogeta west	Whole sample
<b>House hold head</b>	10.0%	10.0%	13.3%	<b>11.1%</b>
<b>Wife</b>	76.7%	80.0%	73.3%	<b>76.7%</b>
<b>Any household member</b>	13.3%	10.0%	13.3%	<b>12.2%</b>

*Source: Survey Data (2015)*

Respondents were asked how they transported their water from the source to their households and all of them said that it was either carried on their heads, backs or with their hands. Women and girls then suffered greatly during the dry seasons for they had to use a lot of energy looking for water. Contrary to the popular result that school going girls miss some of their school time in search of water, this was not the case in South Imenti.

### **5.5 Social Characteristics of Households and Water Sourcing**

The social characteristics of households, very much influences their access to water. Ayanshola et al (2010) and Mu et al, (1990), posit that the time taken to collect water and the number of

women in a household are some factors that are attributed to a household's water demand. Totoum (2013) argues that the number of people in a household determines whether the household obtains its water from an improved source or not. Dabbert and Arouna (2009) quoting Keshavarzi et al. (2006) and Froukh (2001), observe that both household size and composition affect water use. This study set out to investigate whether social characteristics influenced in any way the water sourcing behavior of households. Time taken to collect water and household size are the factors investigated. The following sections present the findings of the study.

### 5.5.1 Time Taken to Collect Water

The study aimed at establishing the amount of time that households in Imenti South spent while collecting water. Respondents reported to spending between two minutes and an hour in fetching water. Piped water into dwelling source had the least time with all respondents stating that they spent less than five minutes fetching water from this source.

**Table 5.18 Time Taken to Fetch Water from Different Water Sources**

<b>Time range in minutes</b>	<b>Frequency</b>	<b>Percentage</b>
<b>0-15</b>	73	81.1
<b>16-30</b>	6	6.6
<b>31-45</b>	7	7.7
<b>Above 46</b>	4	4.4
<b>Total</b>	90	100.0

*Source: Survey Data (2015)*

From the table, the results indicate that the time range 0-15 minutes was spent by majority of the water collectors in the households and 81.1% of households reported that. The study revealed that this time was taken to collect water from piped water into dwelling and piped water into yard. This included those households without water connection but fetched from the neighbours. As earlier indicated the study area is densely populated hence walking from one household to the

next does not take much time. In all the wards, water from the two sources took the least time to collect.

The study revealed that fetching water from the river (surface water) took the longest time (above 46 minutes) and only 4.4% of the households reported this. Majority of the households who reported that they take a long time in water collection were those from Kamwiga village in Mitunguu ward. This is because their village is far from the river and therefore the respondents have to walk for a longer distance and use more time to get to the river for water. Besides, it was observed that they had to go down a steep hill to get to the river and carrying a 20 litre jerrican of water up the valley proved difficult. This activity, on several occasions led to breakage of the water jerrycans and this meant spending more money, which was hardly enough, on purchasing a replacement. To some extent, this occurrence contributed to villagers holding meetings to deliberate on how they can curb the water shortage problem but as by the time this study came to an end, there was no viable solution that had been brought forth.

Another observation that the study made is that these respondents had the highest number of those who visited the river more to fetch water and also wash clothes. After further probing it was established that since the village was far from the river, the piped water they got from the water associations they belonged to was not enough and most times the water level was very low hence did not get to their homes. In fact one respondent said that she spent one and half hours collecting water from the river when the piped water was unavailable.

### **5.5.2 Daily Water Collection Frequency**

The frequency of water collection was studied. Among the respondents that took part in the study, 82 of the households reported that they fetch drinking water once daily. 82.9% of them said that their source was piped water into dwelling while 15.9% had piped water into yard/plot as their source. Only 1.2 percent of those who fetched drinking water once had protected well as their source. Only seven households fetched drinking water twice a day 71.4% of which sourced it from piped water into dwelling and 28.6% got theirs from piped water into yard.

It was noted that majority of those who said they collected drinking water once daily were from Mitunguu and Abogeta East wards. These are dry wards and people have several alternative sources of water including protected and unprotected springs as well as surface water. Since the

respondents have to attend to other household chores as well as other income generating activities, fetching drinking water once daily makes sense as one does not have to get to the water source every time there is need to quench thirst as doing so will be time wasting. Abogeta West ward is wet as pointed out earlier and also the area has the highest number of households with piped water into premises. Those respondents who reported that they fetched drinking water many times in a day majorly came from this ward. The possible explanation here could be that because there was no fear of the taps running dry due to low water volumes, residents here did not see the need to fetch and store drinking water in a container as it would be fetched directly from the taps as needed.

Across the three wards, respondents said that they boiled drinking water. This prompted the use of a five litre container to collect the water especially among the Abogeta East and Mitunguu residents. Save for drinking water, respondents could not clearly tell the number of times they collected water for cooking, washing clothes, bathing and house cleaning. However they all alluded to collecting water for those uses more than seven times in a day. Some said more than ten times, others clearly mentioned that they cannot give a specific number for they did so many times. There was an indication from some of the respondents that this however was not the case during the dry seasons as the water volume went down and in some areas like Mitunguu ward where the irrigation water was used, there were shifts regulating how various sections would get water. This meant there were some days when some sections did not have water in their taps at all and this also affected the number of times that the water was collected for the various uses.

**Table 5.19 No. of Times Drinking Water is Collected Daily and source**

			No. times in a day is the water fetched for drinking			Total
			once	twice	many	
<b>household's main source of drinking water</b>	Piped water into dwelling	Count	68	5	1	74
		% within How many times in a day is the water fetched for drinking	82.9%	71.4%	100.0%	82.2%
	piped into yard/plot	Count	13	2	0	15
		% within How many times in a day is the water fetched for drinking	15.9%	28.6%	0.0%	16.7%
	protected dug wells	Count	1	0	0	1
		% within How many times in a day is the water fetched for drinking	1.2%	0.0%	0.0%	1.1%
Total	Count	82	7	1	90	
	% within How many times in a day is the water fetched for drinking	100.0%	100.0%	100.0%	100.0%	

*Source: Field Data (2015)*

### **5.5.3. Quantity of water collected per trip**

On the quantity of water collected for each use (drinking, cooking, washing clothes, bathing and house cleaning) per trip, there was a variation between water collected for drinking and for other uses depending on where the water was sourced from. Drinking water was collected using a small five litre container when the source was piped water into dwelling otherwise a 20 litre container was used. The fact that the drinking water was collected using a 20 litre container does not necessarily mean that all of it is normally used for drinking. The survey revealed that only a

little is used for drinking and the rest is used to satisfy other domestic needs where it is required like washing clothes, cleaning utensils and cleaning the house for those who had cemented ones.

For all the other uses, regardless of the water source, a 20 litre container was used. The survey noted that every household in both Mitunguu and Abogeta East wards had at least two 20 litre jerrycans that were used for water collection. During the survey, the researcher noticed that at times, especially in the evenings, women would carry two 20 litre containers of water, one on each hand a task that was very tiresome.

One important observation that the survey made is that during the school holidays, the amount of water used in households was generally higher than that used when schools are in session. On further probing, it was discovered that those households with more female members, still used more water than those whose female members were few. However, the fact that more water was used during this period did not necessarily mean that the amount of water fetched per trip increased but the frequency of trips to the water source and back were definitely more.

However, all respondents stated that they did not collect any water for domestic agriculture for they mainly relied on rainfall or used sprinkler irrigation to water their plants. This made it difficult to compute both the number of times daily and the quantity of water fetched per trip for domestic Agriculture.

#### **5.5.4 Other Activities Performed at the water source**

Water points are used as socialization agents and therefore the study aimed at understanding the kind of activities that respondents took part in once they got there. This information was captured by asking respondents whether they washed clothes, showered or washed utensils at the water point. Many of them said they did not participate in such activities and the reasons they gave were that it was unhygienic to do so since there were other water users downstream and doing so amounted to polluting the water. The local administration also discouraged people from washing clothes, their bodies or utensils from the river and anyone caught doing so would have to answer a case in the chief's office. This, the researcher later learnt was so as to enhance the cleanliness of the river water and also keep it safe from chemical contamination so that the people downstream would also have access to safe drinking water. There are however those who said that when there were water shortages especially during the dry season, they would carry clothes

and wash them in the river. The reason they gave was that carrying water for washing clothes was a difficult task since one would be required to make so many trips to the river. Respondents also said that washing from the river saved time.

#### **5.5.5 Effect of Water Sourcing on other Household Activities**

To understand the effect of water sourcing on other household activities, respondents were asked whether fetching water affected other activities in their households and if it did they were asked to state the activities that were affected and how they were affected. As table 5.9 below shows, 58% of the respondents said that other activities in their households were affected by fetching water. Majority of those who answered to the affirmative were women. The reason behind this answer, the study established, is because they were the ones tasked with sourcing water for their households. 42% of the respondents said no activities were affected. Those who said that water collection had an effect on other household activities mentioned going to the farm, household chores like cooking and baby care, feeding cattle, schooling and casual labour as the affected activities.

On being asked to explain how the activities they mentioned were affected, they said that all these activities were delayed any time the women had to go collect water especially from the river or the springs for they were relatively far from the homestead. The survey found out that the delay had further effects on their households. It was reported that sometimes, when the women went to fetch water in the evening, they would be late in preparing supper for their families something that some of their spouses picked a quarrel from hence causing a misunderstanding. It was reported that this water collection sometimes caused delays in food preparation leading to children sleeping late and this had an effect in their school performance the following day.

The study revealed that the people that are involved in getting water for the various households are female as we have earlier seen. That is, women play an important role in fetching and making water available for household use. This would have an effect on their time and productivity. The more time they spent in getting or making water available in their various home the more time they lost in fulfilling other responsibilities. This can be seen in the work of Ifabiyi et al. (2010)

where women lost considerable productivity time in their quest to make water available for their households.

**Table 5.20 Effect of household activities on fetching water**

<b>Effect</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	52	57.7
No	38	42.2
<b>Total</b>	<b>90</b>	<b>100.0</b>

*Source: Survey Data ( 2015)*

To know the mode of transport that was used for water collection from the water source to the household, the respondents were read for options to choose from. These included: carry on one's back /head/ hands, donkey(s), cart, bicycle, wheel barrow and vehicle. All the respondents reported that water was carried on ones back, head or hands. This caused even more delays on other household activities as by the time one got home they were already tired and would have to rest first before embarking on other activities. During such times, there was less water available for use per person and this compromised hygiene in the household. Clothes were not washed as regularly as they should be and utensils were not cleaned as thoroughly as they should be as there was no enough water to rinse them well, hence dangerous for the household members.

### **5.5.6 Household Size**

The number of people living in a household as earlier pointed out is a major determinant of the choice of water source that the household draws its water from. This study sought to investigate the household size of the respondents. The question posed to respondents was “how many people live in your household”. The study established that the average number of people that lived in the households where respondents were drawn from was four. The minimum number of people was two and the maximum was ten. Households with more than seven people were mostly found in

Mitunguu ward and the study revealed that respondents here had water problems as compared to those in Abogeta West and Abogeta East Wards respectively. Literature (Keshavarzi et al. 2006, Froukh 2001, Dabbert and Arouna 2009) has shown that both household size and composition affect water use.

Dabbert and Arouna 2009 in their study have shown that the larger the household, the greater its water consumption, a finding that corresponds with the current study. On household composition, the study observed that households that had more female members than males generally sourced and used more water as opposed to those whose composition had more males than females. Another important observation that the study made was that those households which had more children of below five years, had more water uses and therefore ended up using more water than those whose members were majorly adults. This may be explained by the fact that little children tend to dirtify themselves quite often and therefore their clothes have to be frequently changed and washed. They also feed at a more frequent rate and therefore more utensils are used in the households and these require more water to clean.

Households with many members have their income affected negatively which in turn affects their access to clean drinking water. This was not the case in this study as the survey results revealed that there was no significance relationship between number of household members the households income and access to clean drinking water.

### **5.6 Perceptions risks**

People are concerned about their health. Much awareness throughout the world has been deliberately created so as to sensitize people on the usefulness of using clean drinking water. In terms of drinking water quality, user perception is one of the most important things, sometimes exceeding actual quality of water especially when it concerns the quality of drinking water for the user communities (Doria 2010). There are different factors that influence the perception of drinking water quality, including: Human sensory perceptions of taste, odour and colour of water are related with mental factors and some extent taste, which is the more important because it may detect water contamination related to chemicals, People may perceive risks if they experience health problem caused by water, Experience with the previous water source status based on its

taste, colour and odour change. For example the change in the colour of water from yellowish to bluish may feel that the water is perceived not good water (Doria, 2010). Information plays a great role in changing people's perception on the water source behaviour. It may be person to person or using media (like newspapers, brochures etc.) but in rural areas and poor urban residents interpersonal information is important.

Under this section of the study, the safety of the water used by residents of Imenti South and the ways in which they treat the water they drink is discussed. This is important in understanding the seriousness that respondents attach to the safety of the water drunk in their households.

### **5.6.1 Water safety**

The study sought to get the views of the respondents as regards their perceptions and risks about the water that their households' used. They were asked whether they thought the water they used for drinking was safe. From the findings presented in table 5.18, 63.3% of the respondents said the water was safe and 36.7% did not believe in the safety of the water. 80.0 % of those who said that the water was safe for their households use were from Abogeta East ward. The possible explanation to this is that in this ward, water was sourced from springs as the households reported and in their view, spring water was very clean. Those who believed that the water was safe for their consumption had several explanations for their answer. They explained that the water was piped and there is no way it can be dirty. They further strengthened their answer by revealing that the intake tanks mostly were constructed at the source of the springs and had concrete covers and therefore, foreign objects and animals can not get into the tank.

**Table 5.21 Water Safety**

			Ward			Total
			Abogeta East	Mitunguu	Abogeta West	
<b>Safety of water used for drinking in households</b>	Yes	Count	24	15	18	57
		% within ward	80.0%	50.0%	60.0%	63.3%
	No	Count	6	15	12	33
		% within ward	20.0%	50.0%	40.0%	36.7%
Total		Count	30	30	30	90
		% within ward	100.0%	100.0%	100.0%	100.0%

*Source: Survey Data (2015)*

On probing for the reasons that the households had on the safety of water, 42.2% of those who said the water was safe anchored their response on the fact that the water was piped and therefore contamination was minimal followed by 32.2 % who talked about the colour of the water. On enquiring about the colour and smell of the water, the respondents reported that the water was colourless most of the times (unless it rains and soil erosion takes place giving the water a brown colour), it was odourless, and that there was no case of sickness or death that had been reported to the best of their knowledge. 4.4% of the households mentioned that the water was treated at the source. These were mainly older people in Mitunguu ward who mentioned that the municipal provided water was always treated using ‘medicine’ which the researcher established was chlorine. Here, the study concluded that there was no proper communication in in the community about water affairs either by the local government or even by the management of the various water associations because, some households were not aware that the municipal water was not in operation.

**Table 5.22 Reasons for Safety of Water**

			ward			Total	
			Abogeta East	Mitunguu	Abogeta West		
Reasons	piped water	Count	12	12	14	38	
		% within ward	40.0%	40.0%	46.7%	42.2%	
	clear	Count	12	7	10	29	
		% within ward	40.0%	23.3%	33.3%	32.2%	
	treatment at source	Count	0	3	1	4	
		% within ward	0.0%	10.0%	3.3%	4.4%	
	particles	Count	0	2	1	3	
		% within ward	0.0%	6.7%	3.3%	3.3%	
	no trust	Count	6	6	4	16	
		% within ward	20.0%	20.0%	13.3%	17.8%	
	Total		Count	30	30	30	90
			% within ward	100.0%	100.0%	100.0%	100.0%

Source: Survey Data (2015)

Those respondents who stated that they did not think the water was safe anchored their response on health issues. They explained that though the water their households drunk did not look dirty, they know it had microorganisms that can cause stomach problems like diarrhoea and amoeba. Others said that there were particles in the water and sometimes, when pipes had breakages, some insects found their way into the water. However all agreed that the water they fetched from the river during shortages was not safe for drinking unless it was boiled.

### 5.6.2 Water treatment

The study sought to establish whether there is anything that the respondents did to the water to make it safe for drinking. As table 5.20 below shows, majority (87.8%) of the respondents reported that they took some action of making the water they drunk safer and 12.2 % said they did nothing. Mitunguu had the highest number of the households who reported that they did something to make the water they drunk safe at 90.0 %. This is not surprising considering that this is the ward where surface water was utilised more than the other wards. Both Abogeta East and West had 86.7% of their households taking action in making the water they drunk clean.

**Table 5.23 Water Treatment**

			Ward			Total
			Abogeta East	Mitunguu	Abogeta West	
Is there anything you do to make your water safer for drinking	Yes	Count	26	27	26	79
		% within ward	86.7%	90.0%	86.7%	87.8%
	No	Count	4	3	4	11
		% within ward	13.3%	10.0%	13.3%	12.2%
Total		Count	30	30	30	90
		% within ward	100.0%	100.0%	100.0%	100.0%

Source: Survey Data (2015)

### Reasons behind Taking Action in Making the Water Safe

The study sought to know the reasons behind water treatment by the households. The answers that were given are varied as shown on the table below. Among those who treated their drinking water, 74.4% reported that they do so to kill germs and 25.6% said that the action they took was geared towards removing particles. Respondents explained that though the naked eye could not see the small bacteria and amoebas in the water, they were aware that water has many of them that can lead to illness hence causing one to spend a lot of money in hospital for treatment.

**Table 5.24 Reasons behind Water Purification**

			ward			Total
			Abogeta East	Mitunguu	Abogeta West	
Reason	Remove particles	Count	9	7	7	23
		% within ward	30.0%	23.3%	23.3%	25.6%
	Kill germs	Count	21	23	23	67
		% within ward	70.0%	76.7%	76.7%	74.4%
Total		Count	30	30	30	90
		% within ward	100.0%	100.0%	100.0%	100.0%

Source: Survey (2015)

### Water Treatment Methods

To investigate how they treated the water, the researcher read out options one at a time and asked the respondents to confirm or deny that they used the method. Majority of the respondents (80.0%) revealed that they boiled the water, allowed it to settle and then sieved it using a sieve in order to remove particles and 10.0 percent alluded to only letting the water settle before drinking. This they did when the water had many particles or was brown because of mixing with soil, the study established.

Though piped water was the main source of drinking water for households in this study, there were variations on its continuous availability. Thus, as regards water treatment, households which could not access piped water continuously had a choice of either treating or not treating water from other sources. Interestingly, households in Imenti South perceived water not only from unimproved but also improved sources to be of high risk and therefore they treated it. Like earlier studies providing risk information (Jalan and Somanathan 2008; Madajewicz et al. 2007

as quoted in Onjala et al. 2013) found out, this result from the current study confirms the important role perceived risk plays in changing health behaviour. These results also resonate with previous findings by Nauges and Van den Berg (2006), namely that households are aware that treating non-piped water lowers the risks related to the consumption of unimproved water.

**Table 5:25 Water Treatment Methods**

			ward			Total
			Abogeta East	Mitunguu	Abogeta West	
Water Treatment Methods	boil only	Count	1	0	3	4
		% within ward	3.3%	0.0%	10.0%	4.4%
	Let it settle	Count	2	5	2	9
		% within ward	6.7%	16.7%	6.7%	10.0%
	boil and filter	Count	25	24	23	72
		% within ward	83.3%	80.0%	76.7%	80.0%
	other	Count	2	1	2	5
		% within ward	6.7%	3.3%	6.7%	5.6%
Total	Count	30	30	30	90	
	% within ward	100.0%	100.0%	100.0%	100.0%	

Source: Survey 2015

### 5.6.3 Discussion

#### *i) Sources of Water in Imenti South*

In Imenti south, the water sources that are accessible to households are piped water into dwelling, piped water into yard, rain water, protected springs, unprotected springs, and surface water mainly rivers. The main sources of drinking water are piped water into dwelling and piped water into yard/plot. For other household uses like cooking, washing clothes, bathing and housecleaning, the main source of water used is piped water into dwelling and piped water into

yard. Protected springs, unprotected springs, rain and surface water are the alternative sources of water for all the household uses except housecleaning. There were no significant differences between female responses and male responses with regard to water sources for the various uses. These findings are in line with those of Dungumaro (2009), who observed no significant differences between male-headed and female-headed households' cited water sources for domestic use in South Africa.

### ***ii) Water sourcing behaviour of households in Imenti south***

The task of collecting water for various domestic uses in Imenti south was largely the responsibility of the females. Both the male and the female respondents alluded to the fact that mothers and their daughters were the primary water collectors. These findings agree with those of Mahama (2013) who found that women were responsible in fetching water for their households in Accra Ghana. They also agree with those of Onundi and Ashaolu (2014) that the total number of females involved in providing water for households is significantly greater than males. The study also found out that the mother and female child were the key water allocators in the household just as Onundi and Ashaolu (2014) found out from their study. However, in the current study, the trend was most visible during the dry periods and this may be because that's the time there is a shortage of piped water and the commodity is sourced from springs and rivers, carried by hand, on the head or on someone's head, an act which is tiring in nature.

Sourcing for water is an activity that had an effect on women's time and productivity. The more time they spent in getting or making water available in their various homes the more time they lost in fulfilling other responsibilities.. This can be seen in the work of Ifabiyi et al. (2010) where women lost considerable productivity time in their quest to make water available for their households. This study further revealed that female possessed the overriding power to allocate indoor water in households sampled. The reason for this veto power on who use what water may be because they (female) are the providers in the first place. This is because they bear the burden of providing the water, if it is used carelessly and not conserved for indoor water activity that matters most.

Contrary to the common findings in water studies that females are key water providers in all areas, this study negated that in both Abogeta East and Abogeta West wards. In Abogeta West, the adult male provided water in 13.3% of the households. On probing further, it was discovered that culture played a role. There is a general assumption in Imenti south that men don't do household chores as the excerpt above illustrates. However this belief has slowly been fading off and in some areas, the rate at which this is happening is faster. It is for this reason that some men in this ward did not see anything wrong in fetching water for their household.

In Abogeta West, the male child occupied 10.0% in sourcing water for the household. The researcher asked the reason why the male child was also involved in fetching water in the area. The respondents observed that it was a deliberate step that parents were taking to involve the male child in household activities in an effort of making them more responsible men in future.

This study further established that during school holidays and weekends, the amount of water sourced and used by households across the three wards increased compared to when schools were on session. This was because during holidays, there were more water consumers. Another observation that the study made is that those households with more female members, also consumed more water than others. The assumption here is that women and girls generally used more water than males.

### *iii) Factors influencing water sourcing*

#### **Income**

Household income is one of the factors that is quoted by various studies as a major influence of a household's access to clean drinking water. In this study, majority of the households had an income of less than KShs 10000 monthly from the small scale farming that they practiced. Many households that did not have own connection of piped water into dwelling fell in the lowest income level in the study- below ten thousand. The results of the study revealed that there was a relationship between household income and access to clean drinking water source. These results are supported by Bosch and Others (2001) who posit that the higher income groups can afford to have private connections (piped water into premises). Mahama (2013) also found out that wealth determining an individual's level of access to improved sources of water for drinking. This

means that as one's level of income increases, he or she is likely to have access to improved sources of water for drinking because he or she has a higher purchasing power.

### ***Risks and perceptions***

Perceptions of drinking water safety and risk seem to be consistent and tap water is generally regarded as safe, (Doria 2010). The current study findings indicate that generally, water sources in Imenti South were safe. Piped water into premises and piped water into yard, which is considered the safest for drinking, was connected from the existing rivers by building water intake tanks and piping the water to people's households. There was no treatment done at the intake though, and people boiled the water in their homesteads in order to make it safe for drinking. The water sourced from was brown in rivers however, was not considered safe for household drinking. This is because sometimes it was brown in colour, especially during the rainy seasons, and also it was believed to be infested with microorganisms such as amoeba and some bacteria.

### **Time Taken for Water Collection**

The time taken for water collection in Imenti South was between a few minutes walk to the water source to more than 60 minutes (an hour). Surface water took the longest time to be sourced while piped water into dwelling took the least time.

## CHAPTER SIX

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 6.1 Introduction

This study set out to investigate the water sourcing behaviour of the households in Imenti South as well as analyse the factors that influence their water sourcing behaviour. The main question that guided the study was: what are the factors that could be influencing access to clean drinking water by households in Imenti South? This chapter gives a synopsis of the main study findings and draws conclusions and recommendations based on the research findings.

#### 6.2 Summary of the Findings

Both qualitative and Quantitative data was collected and analysed. The process of data collection began with a pilot study of ten households and this helped in making changes in the questionnaire in readiness for actual data collection. During the actual data collection period, a total of 90 households were surveyed indicating 100% response rate from the respondents.

##### 6.2.1 Water Sourcing

In this study, various Sources of water were found to be in use by the households. Piped water into dwelling was the main source of drinking water at 94% while% of the sampled households used piped water into yard/ plot as their main source of drinking water. The alternative sources of drinking water were rain, protected spring, unprotected spring and surface (river) water. Rain water was an alternative source in all the three wards. The protected and unprotected sources were used by households in Abogeta East whereas those in Mitunguu Ward used river water as their alternative source of water. For all the uses that households have for water; Drinking, cooking, washing their bodies, cleaning their houses, washing clothes and farming, piped water into dwelling was found to be the main source of water and the protected spring, unprotected spring, rain water and river were the alternative sources. The study however established that rain water was mainly harvested using small household containers like sufurias, wash basins and small water storage tanks of not more than 100 litres and its use was short-term, mainly during the rainy seasons. The study also established that the only source of water used for domestic

agriculture was piped water into dwelling therefore there was no alternative source of water for this use.

### **6.2.2: Demographic factors influencing water sourcing**

As indicated by the conceptual framework of this study, access to clean drinking water by households is influenced by the demographic characteristics of the household. The demographic characteristics that were investigated in the survey were age, gender and education of the household head. All of them influenced the water sourcing behaviour and access to clean drinking water by the households.

Majority of the respondents had completed secondary school education/ A level and several others had either middle college level of education or had gone through university and completed. These put together formed the main level of education attained by respondents. This explains why there was a huge number of households with piped water into dwelling as their main source of water.

The study established that there was an 8% difference between the male and female respondents. The male respondents accounted for 54% while the female respondents were 46%. The study targeted household heads and in the region where the study was carried out, the household heads were mainly men. It was established that many of the households that did not have own piped water connection into their premises were female headed. It can thus be concluded that gender of the household head influenced access to clean water by households.

### **6.2.3. Economic factors influencing water sourcing**

The economic factor that was explored was households' total monthly income. To help get a clear understanding of the same, a households type of housing and the materials used in construction of the main house as well as whether the household made any payments for water were investigated. The study established that most households had a monthly total income of less than KShs 10000, and that this was mainly from farming. It was also established that permanent and semi permanent houses are where households lived and that these houses were roofed with iron sheets and the wall materials were mainly wood and concrete. The study established that

income levels influenced water sourcing as those households without connection of water in their households had a total monthly income of less than KShs10000.

### **6.2.3. Social factors influencing water sourcing**

Social factors, as illustrated by the conceptual framework influences access to clean water by households. This study established that the number of people that live in a household (household size) and the time taken to collect water influenced access to clean water by households. It was established that the higher the number of people in a household the lesser the water available for their use. Long distance travelled to the water source meant more visibility of the person responsible for deciding how water will be used in the household as the water collected was often little. In addition the study established that water was carried using hands, on ones back or on one's head.

### **6.3 Conclusion**

After careful analyses of field data, three conclusions can be drawn in line with the study objectives. First, demographic characteristics of households affect access to clean drinking water by households. Secondly economic factors (households' total monthly income) influence access to clean drinking water by households and thirdly the time taken to collect water, the distance travelled and the household size, all influence access to clean drinking water by households'.

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## APPENDIX 1

### QUESTIONNAIRE

Hello. My name is Fridah Kinya Kithinji and I am a masters student at the Institute for Development Studies, University of Nairobi. I am carrying out a study on the factors that influence access to clean drinking water in Imenti South. Your household is among those that I have randomly sampled and I will appreciate your participation through answering some questions that I will ask you. The exercise will take at most 45 minutes. I assure you that the information you will avail will only be used for the academic purposes that this project is meant for and will be accorded at most confidentiality. Your cooperation will be highly appreciated.

Thank you

#### Section A: Questionnaire log book

1. Questionnaire Number \_\_\_\_\_
2. Date of interview \_\_\_\_\_
3. Name of sub location \_\_\_\_\_
4. Name of village \_\_\_\_\_

#### Section B: Demographic Details

5. What is your name? (*Optional*) \_\_\_\_\_
6. What is your age in complete years? \_\_\_\_\_
7. Sex of the respondent (*observe*)
  - a) Male [ ]
  - b) Female [ ]
8. Position of the respondent in the household.
  - a) Father [ ]

- b) Mother [ ]
- c) Son [ ]
- d) Daughter [ ]
- e) Other (*specify*)\_\_\_\_\_

9. What is your relationship to the household head? ( *Skip if household head is the respondent*)

\_\_\_\_\_

10 .What is your spouses age? ( *If respondent is husband or wife*) \_\_\_\_\_

11. Marital status

- a) Married [ ]
- b) Single [ ]
- c) Widowed [ ]
- d) Separated [ ]
- e) Divorced [ ]

12. Level of education

		<b>Household head</b>	<b>Spouse</b>	<b>Other (<i>member of HH who sources water</i>)</b>
a)	Some Primary			
b)	Primary completed			
c)	Some Secondary,			
d)	Secondary completed, A-Level			
e)	College (Middle level) ongoing			
f)	College (Middle level) completed			
g)	University ongoing			
h)	University completed			
i)	Primary ongoing			
j)	Secondary ongoing			
k)	None			

**Section C: Household Characteristics**

13. What is the main type of residential house? (*Observe the following and tick*)

Type of house	Roofing material	Type of floor	Wall material
Permanent [ ]	Iron sheets [ ]	Earth [ ]	Wood [ ]
Semi-permanent [ ]	Corrugated sheets [ ]	Cement [ ]	Mud [ ]
Temporary [ ]	Asbestos [ ]	Wood [ ]	Concrete [ ]
	Thatch [ ]	Tiles [ ]	Metal sheets [ ]
	Other [ ]	Other [ ]	Other [ ]

14. How many people live in your household? \_\_\_\_\_

- a) Adult male [ ]
- b) Adult female [ ]
- c) Male child (under 15years) [ ]
- d) Female child (under 15 years) [ ]

15. What is your household's main source of income? \_\_\_\_\_

16. What is your household's monthly income? (*Tick the appropriate*)

Category	HHH	Spouse	Other HH member	Total
0-10000				
10001-20000				
20001-30000				
30001-40000				
40001-50000				
50000 and above				

17. Do you make any payments for the water used in your household? Yes [ ] No [ ]

18. If yes, how often? \_\_\_\_\_

19. How much do you pay? \_\_\_\_\_

20. Explain \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Section D: Drinking Water Source

21. What is your household's main source of drinking water?

- |                                  |  |
|----------------------------------|--|
| a) Piped water into dwelling [ ] | h) Unprotected dug wells [ ]   |
| b) Piped into yard/plot [ ]      | i) Unprotected springs [ ]   |
| c) Public taps [ ]               | j) Carts with small tank/drum [ ]  |
| d) Boreholes/tube wells [ ]      | k) Tanker truck [ ]  |
| e) Protected dug wells [ ]       | m) Bottled water [ ]   |
| f) Protected springs [ ]         | n) Surface water (river, dam, lake, Pond,<br>stream, canal, irrigation channels) [ ] |
| g) Rain water [ ]                |  |

22. Are there any other sources of water used by your household? Yes [ ] No [ ]

23. If the above is Yes, state the other sources of drinking water.

- a) Piped water into dwelling [ ]
- b) Piped into yard/ plot [ ]
- c) Public taps [ ]
- d) Boreholes/ tube wells [ ]
- e) Protected dug wells [ ]
- f) Protected springs [ ]
- g) Rain water [ ]
- h) Unprotected dug wells [ ]
- i) Unprotected springs [ ]
- j) Carts with small tank/drum [ ]

- k) Tanker truck [ ]
- l) Bottled water [ ]
- m) Surface water (River, Dam, Lake, Pond, Stream, Canal, Irrigation channels). [ ]

24. Please state the main source and alternative source for each use of water. (*Interviewer to read the options and note down responses*)

	<b>Main source</b>	<b>other source</b>
a) Drinking	_____	_____
b) Cooking	_____	_____
c) Washing clothes	_____	_____
d) House cleaning	_____	_____
e) Bathing/washing your bodies	_____	_____
f) Domestic agriculture	_____	_____
g) Other (write down_____)	_____	_____

- |                              |                               |   |
|------------------------------|-------------------------------|---|
| a) Piped water into dwelling | f) Protected springs          | k) Tanker truck   |
| b) Piped into yard/plot      | g) Rain water                 | l) Bottled water  |
| c) Public taps               | h) Unprotected dug wells      | m) Surface water (river, dam, lake, Pond, stream, canal, irrigation channels) |
| d) Boreholes/tube wells      | i) Unprotected springs        |   |
| e) Protected dug wells       | j) Carts with small tank/drum |   |

25. Who usually goes to the source to fetch the water for your household?

- a) Adult male [ ]
- b) Adult female [ ]
- c) Male child (under 15years) [ ]
- d) Female child (under 15 years) [ ]

26. For each source of water, how long does it take to go there, get water and come back?

- a) Piped water into dwelling\_\_\_\_\_

- b) Piped into yard/ plot \_\_\_\_\_
- c) Public taps \_\_\_\_\_
- d) Boreholes/ tube wells \_\_\_\_\_
- e) Protected dug wells \_\_\_\_\_
- f) Protected springs \_\_\_\_\_
- g) Rain water \_\_\_\_\_
- h) Unprotected dug wells \_\_\_\_\_
- i) Unprotected springs \_\_\_\_\_
- j) Carts with small tank/drum \_\_\_\_\_
- k) Tanker truck \_\_\_\_\_
- l) Bottled water \_\_\_\_\_
- m) Surface water (River, Dam, Lake, Pond, Stream, Canal, Irrigation channels). \_\_\_\_\_

27. How many times in a day is the water fetched for drinking? \_\_\_\_\_

28. How many times in a day is the water fetched for other uses? \_\_\_\_\_

29. For each of the uses, what is the quantity of water fetched per every trip? (*Ask to be shown the container used*)

- a) Drinking \_\_\_\_\_
- b) Cooking \_\_\_\_\_
- c) Washing clothes \_\_\_\_\_
- d) House cleaning \_\_\_\_\_
- e) Bathing/ washing your bodies \_\_\_\_\_
- f) Domestic Agriculture \_\_\_\_\_
- g) Other ( write down) \_\_\_\_\_

30. When you get to the water source, do you wash clothes/ shower/wash utensils from there?

Yes [ ] No [ ]

31. (*If yes*) what makes you perform these tasks at the water source?

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32. Does fetching water affect other activities in your household? Yes [ ] No [ ]

33. If yes which ones? (*List*) \_\_\_\_\_

34. How are they affected? (*Please explain*) \_\_\_\_\_

35. What mode of transport does your household use to collect water?

a. Carry on one's back /head/ hands [ ]

b. Donkey(s) [ ]

c. Cart [ ]

d. Bicycle [ ]

e. Wheel barrow [ ]

f. Vehicle [ ]

g. Other [ ] specify \_\_\_\_\_

36. Who decides how the water sourced is used in the household? \_\_\_\_\_

### **Section E: Perceptions and Risks**

37. In your view, is the water used for drinking in this household safe? Yes [ ] No [ ]

38. Give a reason for your answer above.

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39. Is there anything you do to make your water safer for drinking? Yes [ ] No [ ]

40. Explain your reason for your answer above

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41. How do you treat your drinking water to make it safer to drink? (*Tick appropriately*).

	<b>Using</b>	
--	--------------	--

a	Boil only	
b)	Use water filter (e.g. ceramic, sand)	
c)	Boil and Filter	
d)	Add chemicals (bleach/chlorine etc.)	
e)	Strain it through a cloth	
f)	Solar disinfection	
g)	Let it stand and settle	
h)	Other (specify)	
i)	Dont know	

42. How would you rate the quality of your households' drinking water?

- a) Very clean [    ]
- b) Clean [    ]
- c) Dirty [    ]
- d) Very dirty [    ]
- e) Don't Know [    ]

43. Is there anything else you would like to add?

**THE END**

**THANK YOU.**