AN ASSESSMENT OF WATER AVAILABILITY AND COMMUNITY HEALTH; A CASE STUDY OF GARRISSA DISTRICT, KENYA

BY:
ABDULLAHI ABDI HAJJI
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A DISSERTATION PRESENTED TO THE SCHOOL OF ENGINEERING AND APPLIED SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF BACHELOR OF SCIENCE IN ENVIRONMENT MANAGEMENT OF KAMPALA INTERNATIONAL UNIVERSITY
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DECLARATION

I, ABDULLAHI ABDI HAJJI, declare that this research is my original work and has never been submitted to any university for any award.

Where the works of others have been cited, acknowledgement has been made.

Signature.....

Date.....16/05/2011.....

APPROVAL

I certify that the research submitted was done under my supervision.

SUPERVISOR

NAME: MR. AMMON R. ORISHABA

SIGNATURE.....

DATE.....

DEDICATION

I dedicate this work to my beloved Mother Isnino Hussein Gure, my late father Abdi Sanweine Ibrahim, my supportive sister Fatuma Abdi Sanweine, my brother in law Dr. Mohamed Keinan, and my uncle Abdirashid Sanweine Ibrahim and to all my family, friends and relatives.

ACKNOWLEDGEMENT

First and foremost, I believe it was ALLAH's predestined plans that were unlocked to my situation thereby enabling me to successfully complete this work and to him belongs all praise. I thank God for sustaining me through the exercise.

The task of completing this work has been tireless and expensive both in terms of money and time and depended upon very many people for assistance, encouragement and guidance.
I am indebted to Kampala international University and in particular the School of Engineering and Applied Sciences for allowing me to carry out this research. I would like to thank my supervisor MR. Ammon R. Orishaba for his guidance, technical support and for taking his time to go through this work.

My appreciation goes to my industrious and resourceful sisters FATUMA ABDI, HALIMA ABDI, HODAN ABDI and AMINA ABDI for their unyielding financial support throughout my entire educational life. I can't also forget my Mother for her moral support and giving me the secrets to life through advice. I extend the same to my uncle Barqadle Hussien Gurre, my brother in law Shiekh Farah Siyat, my aunt Ethilo Hussien Gurre, my beloved Cousins Sultano Sahal,and Dr. Abass Aden Sanweiene.

I am also grateful to my Brothers, Sisters and relatives for their love and for showing keen interest in my education.

I together with my colleagues from BURA BOYS SECONDARY SCHOOL(Aab Kahin &sons) especially Mohamed Khadar Aden Sanweine, Abdinasir Harun Khalif, Yakub Abdullahi,Yussuf Diis Shafat and Osman Muse Dahir shared unforgettable moments, problems and encouraged each other. I also extend the same to my concerned friends Farhan A.Guled, Faisal Abdi Mumin, Abdinasir Siyat, Katra Abdullahi, and Dully Bash.

I cannot mention everybody but indeed am thankful to anybody who encouraged and assisted me both morally and spiritually to complete this study successfully.

ACRONYMS

DSOER	District State Of Environment Report
FBOs	Faith Based Organizations
MDGs	Millennium Development Goals
NEMA	National Environment Management Authority
RUWASA	Rural Water And Sanitation
UN	United Nations
UNICEF	United Nations Children's Emergency Fund
WHO	World Health Organization

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ABSTRACT

This dissertation presents the findings of the research conducted in Garissa District. It describes the effects of water availability on community health with the objectives of the study as; to identify the water sources, problems associated with water availability and what can be done to ensure that water is always available and that it has little impact on the productivity of part or whole community. Achieving these objectives would help increase the number of water sources in this community and therefore availability; reduced time spent in water source to fetch water and the diseases associated with water availability. Thereby improved participation of the community members in productive work and more children attaining education with little or no disturbance from water related causes. The methods that were used in data collection included; a sample of about 100respondents being chosen and both stratified and purposive sampling techniques used in soliciting responses by means of research instruments such as interview guide, questionnaires and observation for households, stakeholders in the water sector and the researcher respectively. Data processing and analysis were used to extract meaningful information from the raw data obtained from the field. It was identified that the largest percentage of people that are affected by the burden of water are women and children. This is known to affect their life in terms of disease prevalence impacting greatly on their productive potential especially and it affects school going children's study time. Therefore, there is need for the administration in the district of Garissa to ensure that her communities are sensitized on issues of water availability and water source maintenance, the laws and policies on water are initiated, more water sources are introduced to reduce the distance that women and children travel to fetch water and hence reduced time spent on the queues waiting for water and lowering disease burden.

CHAPTER ONE

INTRODUCTION

1.0 Background of the study

It is safe to say that a world without safe, abundant and easily accessible water is hard for most Americans to imagine -- and one they would find hard to tolerate. The same goes for life without private, relatively clean places in which to go to the toilet. Around the world, however, 1.1 billion people get their water from rivers and ponds or from springs and wells open to the air and subject to contamination. More than twice as many -- 2.5 billion people in all -- use public latrines or the whole outdoors as their bathroom. Access to safe water and basic sanitation were among the "Millennium Development Goals" that 189 heads of state from around the world adopted in 2000. Specifically, they pledged that by 2015 they would reduce by at least half the proportion of people living without those two essential comforts of civilization. The year 1990 was taken as the baseline against which progress would be measured. Reaching those goals would have profound effects on the world's poorest people -- effects far beyond better health, the most obvious one. The World Health Organization and UNICEF recently issued a report on the progress achieved as of 2002, the midpoint in that 25-year period.

In 1990, 77 percent of the globe's population had access to indoor running water, piped public taps, protected wells and rainwater. In 2002, 83 percent of people had those "improved" drinking water sources. Progress is on track to meet the target of 89 percent by 2015. Equally impressive is the fact that 52 percent of people have the best of the "improvements": household running water. "More than half the population of the planet uses piped water at home. That is a stunning achievement," said Jamie Bartram, coordinator of WHO's water, sanitation and health program. China and India together have the most people without safe water or improved sanitation. In the case of sanitation, 1.5 billion people in those two countries do without. Among regions, though, Africa is worst off. The entire sub-Saharan part of that continent today is only somewhat ahead of the United States of 1900. In that year, 42 percent of Americans had access to public water and 29 percent to sewage systems. Among Africans in 2002, 58 percent had access to improved water (only 16 percent with household connections), and 36 percent had improved sanitation.

Although clean water and toilets have many benefits, some are not entirely obvious. Both improvements lead to better health, although how much each contributes has been hard to measure. That is because people's health is also affected by personal habits, methods of storing and cooking food, as well as by education and income. Piped water reduces the incidence of typhoid fever -- an outcome seen both in contemporary studies and in historical analysis. In Philadelphia, for example, a study showed that as water filtration was brought to the city's six water districts between 1902 and 1909, typhoid mortality in each district fell. Between 1888 and 1912, deaths in German cities from that disease fell by 80 percent, with half of the decrease attributed to piped water. But clean water by itself has relatively little effect on rates of other water-borne infections, such as childhood diarrhea. Those illnesses are mostly transmitted by the fecal contamination of food, dishes and hands. They reflect the amount of water a household has for washing and hygiene, not the quality of the water.

For that reason, bringing the source of water to the house or yard reduces the diarrhea rate by 44 percent, while water delivered to a public "standpipe" -- where someone must go with a water container -- reduces the rate only by 6 percent. Trachoma is a bacterial infection of the eyelid responsible for about 6 million cases of blindness worldwide. Better water and sanitation reduces trachoma rates by an average of 27 percent. Once-a-day face washing with a handful of water is one of the four chief interventions being pushed in an international effort to eliminate trachoma. Curiously, health benefits are far down the list of reasons that people in poor countries give for wanting better water and sanitation services. Relief from the drudgery of carrying water long distances -- a chore borne almost entirely by women and girls -- is the chief benefit that people mention. A 2002 UNICEF study of rural households in 23 sub-Saharan countries found that a quarter of them spent 30 minutes to an hour each day collecting and carrying water, and 19 percent spent an hour or more. With closer water comes greater self-esteem, less harassment of women, and better school attendance by girls -- three things spontaneously mentioned by people in Ethiopia, Ghana, Tanzania and India in a different study.

1.1 Problem statement

Every year, millions of the world's poorest people die from preventable diseases caused by inadequate water supply. Hundreds of millions more suffer from regular bouts of diarrhea or parasitic worm infections that ruin their lives. Women and children are main victims burdened by the need to carry water containers every day, they must also endure the indignity, shame, and sickness that results from lack of hygienic sanitation (Ministry of Health Annual Report 2009). The world over about 1.2billion people out of a total third world population of 2.2billion (china was not included in the statistics at that time) were without access to safe drinking water (Vanko Joo 2002). As a result, half of the world's hospital beds were occupied by patients suffering from water related illnesses. The impact of deficient water and sanitation falls primarily on the poor unreached by public services; people in rural and peri-urban areas of developing countries make their own inadequate arrangements. Their poverty is aggravated and their productivity impaired, while their sickness puts severe strains on health services and hospitals (DFID 1998).

Water is a precious and a scarce resource that we take for granted in our daily life ,while in rural areas of the region ,people are confronted more directly with elusive nature as they are more vulnerable to the ravaging cycles of drought and flood ,and the slowly degrading resource base.

1.2 Objectives

1.2.1 General objectives

To assess the water availability and its effects on community health in Garissa district

1.2.2 Specific objectives

- To identify the sources of water in the district
- To establish the problems of water availability on community health
- To find out ways of reducing the problems of community health that are associated with water availability

1.3 Research questions

- What are the major sources of water in this community?
- How does the water availability affect your health?
- What has been done to reduce the problem of water availability on community health?

1.4 Scope of the study

The study was conducted in Garissa district Kenya. The research based on effects of water availability on the community health in Garissa specifically on finding out the water sources and available water, the effects of water availability on community health and establishes remedies to ensuring proper water quality supply.

1.5 Justification of the study.

This study was conducted to provide baseline information and documentation on the available water sources and effects on community health in Garissa District. The results of the study shall be useful to the District in designing future water supply points and putting much emphasis on those that have little or no impurities at all if any. Hence the study shall serve as an effective monitoring and management decisions for water quality and sanitation in the district and forms basis for future research

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter includes sourced out data of the studies conducted earlier on specifically about the water sources, effects of water availability and what can be done to reduce the impacts of water availability on the community health

2.1 Water sources

The water we use cycles endlessly through the environment. The total amount of water in our planet is immense more than 1404 million cubic kms. Ground water is one of our important fresh water resources originating as precipitation that percolates into layers of soil and rock. Ground water makes up the largest compartment of liquid fresh water. The ground water within 1km of the surface in the United States is more than 30 times the volume of all the fresh water lakes, rivers, wetlands and reservoirs combined which are surface water sources. Clean, fresh water is essential for nearly every endeavor, perhaps more than any other environmental factor, the availability of water determines the location and the activities on earth (Cunningham 2002)

Around the world, however, 1.1 billion people get their water from rivers and ponds or from springs and wells open to the air and subject to contamination. More than twice as many -- 2.5 billion people in all -- use public latrines or the whole outdoors as their bathroom. Access to safe water and basic sanitation were among the "Millennium Development Goals" that 189 heads of state from around the world adopted in 2000

2.2 Problems associated with water availability

In cities, the urban poor suffer the indignities of inadequate sanitation and frequently have to purchase water from private vendors. Research in slum and squatter settlements in Jakarta showed that less than a quarter of the city's population have direct connections to piped water system and 30% depend on solely on purchasing water from vendors (Jarman 1997). Poor households can spend up to 40% of their total on water (UNICEF 1995). According to Bern et al, 1992 they noted that, although improvements to water supply and sanitation are more important

for everybody, children are the most vulnerable to the preventable diseases which result from the lack of water, dirty water and lack of sanitation. Over three million children die every year from diarrhoeal disease and dehydration and over half experience more than fifteen attacks of serious diarrhea before the age of five.

The world summit for social development held in Copenhagen in 1995 persisted with the point that over one billion people in absolute poverty live lives characterized by deprivation of basic human needs including those of safe drinking water and sanitation facilities. The social summit urged that in formulating strategies for eradicating absolute poverty ,governments and the international community should implement the commitment to meet basic needs including providing on the sustainable basis, access to safe drinking water in sufficient quantities and proper sanitation for all (UNICEF 1995). According to WEHAB working group, august 2002, diarrhoeal diseases, a result of lack of adequate water and sanitation services, in the past ten years have killed more children than all people lost to armed conflict since World War II.

Water is a precious and a scarce resource that we take for granted in our daily life ,while in rural areas of the region ,people are confronted more directly with elusive nature as they are more vulnerable to the ravaging cycles of drought and flood ,and the slowly degrading resource base. Our natural environment also needs water.

If it is to continue to provide important social, economic and hydrological functions, although we seldom consider that wider context. Clean drinking water and basic sanitation are necessary to prevent communicable diseases and to maintain a healthy quality of life. However, quarter of the world's people lack adequate, clean drinking water and about a half lack effective sanitation (Cunningham et al 2002). The United Nations cautions that if present trends continue, some two thirds of the world's population will live in countries experiencing water shortages by 2025

According to the World Health Organization (WHO), 2000 some countries have a problem of access to clean water. In Mali, for example 88% of the population lacks clean water. In Ethiopia it is 94%. Rural people often have less access to clean water than do city dwellers. Causes of water shortages include natural deficits, over consumption by agriculture and industry, and

inadequate funds for purifying and delivering good water. Also, more than two thirds of the world's households have to fetch water from outside the home. This is a heavy work done mainly by women and children, and sometimes taking two hours a day. The World Summit on Sustainable Development, Johannesburg, 2002, made it clear that, diarrhoearal diseases which are a result of lack of adequate water and sanitation services in the past ten years have killed more children than all lost to armed conflicts since World War II.

World Summit for Children .UN, New York, September, 1990 that aimed at undertaking a joint commitment and to make an urgent universal appeal to give every child a better future ,acknowledged that a major factor affecting the health of children is the availability of clean water and sanitation .Progress in child health is unlikely to be sustained if one third of the developing world children remain without access to clean drinking water and a half of them are without adequate sanitary facilities.

Water supply and sanitation rose up the development agenda more than 20years ago. The 1977 UN water conference in Mar del Plata, Argentina, recommended that the 1980s should be proclaimed the international drinking water supply and sanitation decade (IDWSSD) .in preparation for the launch of the decade, the World Bank and the World Health Organization (WHO) carried out rapid assessments of the water supply and sanitation sectors in more than 100 developing countries. These together with WHO`s five yearly monitoring of water supply and sanitation coverage, provided the baseline statistics against which progress in the sector is generally measured. The picture was depressing one: 1.2billion people out of a total third world population of 2.2billion (china was not included in the statistics at that time) were without access to safe drinking water; 1.7billion had no proper means of excreta disposal. As a result, an estimated 10million people a year were dying from diseases directly related to poor sanitation and half of the world's hospital beds were occupied by patients suffering from water related illnesses.

Also, IDWSSD (1981-1990) was launched at the UN general assembly in November 1980, with all countries adopting the declared target of achieving 100 percent coverage in water supply and sanitation by 1990.To reach the targets would have meant doubling the rate at which new water supply services were then being provided, and more than quadrupling the provision of sanitation

/sewerage facilities. Sector investments by governments and donors would have to rise threefold. The launch of the decade gave water supply and sanitation a publicity boost and led to concerted efforts to speed up progress. the economic climate of the 1980`s,however,was not conducive to massively increased funding, and anyway most sector institutions in developing countries did not have the absorptive capacity to cope with the type of programmed needed to come close to the 100percent coverage goals. Provision of improved water and sanitation services did speed up in comparison with previous years, though in the case of sanitation, it still could not even keep pace with rising population, so the number of people un served continued to rise (DFID 1998)

Every year, millions of the world's poorest people die from preventable diseases caused by inadequate water supply and sanitation services. Hundreds of millions more suffer from regular bouts of diarrhea or parasitic worm infections that ruin their lives. Women and children are main victims burdened by the need to carry water containers every day, they must also endure the indignity, shame, and sickness that results from lack of hygienic sanitation.

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2.3 Ways of ensuring proper water supply

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The constitution of the Republic Of Uganda 1995 provides that "Every person has a right to a clean and a healthy Environment" .This also means each one of us has a responsibility to keep our environment clean and healthy. Also, The Minister of State for Water, Hon. Mrs. .Miria

Mutagamba's message in the water quarterly bulletin that "The water and sanitation sector is one of government of Uganda's priority areas that is vital for poverty eradication and Sustainable Development. Provision of sustainable safe water supply and sanitation services, their proper management and utilization are necessary conditions for improved health and economic development of the populace .The government's plans to provide access to safe and clean water for all by the year 2015 if the required inputs are availed and the current performance trends are maintained and monitored".(DWD , the water quarterly bulletin, Vol. 1,No.1 ,September 2003)

According to the Poverty Eradication Action Plan, Uganda, 2004/5-2007/8, priority actions in rural water sector include;- The government will continue to invest in the expanding rural water supply, taking efficient measures to ensure that the facilities are maintained and that costs are kept down. In order to achieve governments targets in this area, there is need to re allocate expenditures within the sector towards rural water supply. In vision 21 on water and sanitation, clean and healthy world: A world in which every person has safe and adequate water and sanitation and lives in a hygienic environment. This vision 21 statement was adopted by major water and sanitation agencies at the second World Water Forum in 2000 in the Netherlands. The four key components of vision 21 program for action are;- Building on people's energy and creativity, Acknowledge hygiene, water and sanitation as a human right, Commitment and compassionate leadership and good governance, Synergy among partners.

According to the United Nations MDGs, safeguarding human health, including reduction in the mortality rate (associated with lack of access to safe drinking water, inadequate sanitation and poor hygiene) by improving the quality of drinking water.

Bringing about behavioral changes in water, in sanitation and in water quality management and sanitation practices. Important milestones are 35% reduction in the incidence of water –borne diseases by 2010, and 70% reduction by 2015 reduction of the mortality rate among children under five by two thirds through improved access to safe drinking water, adequate and affordable sanitation and improved hygiene practices by 2015

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter contains the description of the area of study, sampling techniques, research instruments and means of data processing and analysis

3.1 Study Area

Garissa district is located in north eastern province of Kenya. The province is the second largest in Kenya after rift valley province. Garissa is the head quarters of the north eastern province. The district is comprised of three divisions which are Sankuri, Korkora and the Central divisions. It's of urban setting whose population is about 190000 according to the last census which had been conducted in the year 2009.It borders Fafi district in the south, Tana River district to the west and Lagdhera district to the north. The district has semi arid conditions

3.2 Sampling Procedure

The responses of local communities living around Garissa district about the knowledge of water available and the related effects were studied in the three selected divisions within the district. Stratified random sampling technique was used alongside purposive sampling technique for the general respondents and key informants respectively. A reconnaissance trip to the study area at Garissa district was conducted in a bid to make contacts and appointments for the schedules of interviews and filling of the questionnaires. Lists of households in each division to be visited were obtained from the chairpersons Local Council one. Giving each household a code, stratified random sampling was carried out to select the households to be interviewed, where the researcher skipped three households and interviewed the 4^{th} and 5^{th} households. However, purposive sampling was used to target those respondents with know how potentials such as the district public health officer, water officer and the local councilors in charge water. A sample size of 100 respondents in all divisions was used for providing data during the study.

3.3 Research instruments

(i) Questionnaires

Semi-structured questionnaires were used to collect data from the respondents on personal characteristics, water sources, the effects and the way forward. These questionnaires were administered in Sankuri, Korkora and the central divisions. This method was selected because it gives the respondents secrecy and convenience of filling in the questions at their time, and answers the questions after having adequate time to think about the contents of the questions.

(ii) Interviews

Interviews were used to collect data from those respondents who could not read or write. Interviews were also used for the key informants, those who were be in position to give more details not covered by the questionnaires. Interviews helped the researcher to probe the selected respondents carefully since it involved face-to-face dialogue(s). The use of interviews also helped the researcher to adjust and meet many diverse explanations since interviewees could not be limited in the participation of the discussions.

3.4. Data processing and analysis.

The raw data was edited, coded and tabulated. Where by editing involved minimization of errors, coding is the classification or grouping of similar answers into meaningful categories. Data was analyzed using qualitative and quantitative methods. Qualitative analyzed whether water is safe to drink, the water sources, the way they are maintained and managed.

Quantitative analyzed population in each house hold, number of respondents, and number of questionnaires, quantity of water used per day, the sources of water. This was presented in tables, bar graphs and frequencies, expressed in percentages for ease of comparison and interpretation.

3.5 Anticipated problems.

- The researcher found a problem of translating the questionnaire in the local language which is easy for the respondents to give corresponding responses.
- The researcher found an obstacle especially from hostile, frustrated individuals affecting the researchers work.
- The respondents at the end of the interview or answering the questionnaire required some form of boosting in terms of money for the time spent.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.0 Respondent's characteristics

A total of about 100 respondents were interviewed and answered the questionnaire respectively.73% of whom were female and about 23% were male , which was an indication that most of the issues regarding water were common amongst the females and children than the male counter parts.

Table 1: ages of respondents

Age bracket	Frequency	Percentage (%)
15-25	25	25
26-35	44	44
36-45	19	19
46-55	8	8
56 above	4	4
	100	100

Source: from field by researcher

Figure 1: **ages of respondents**

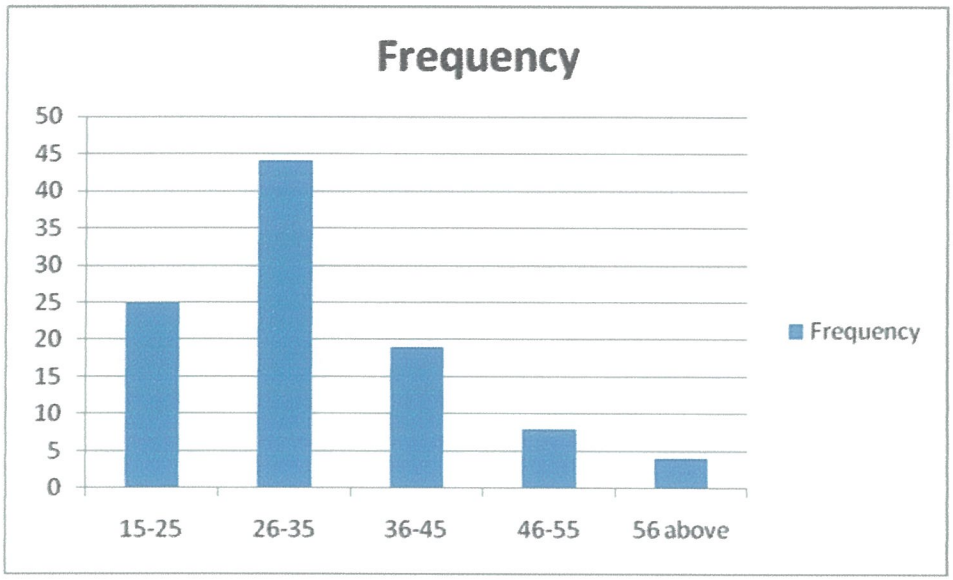


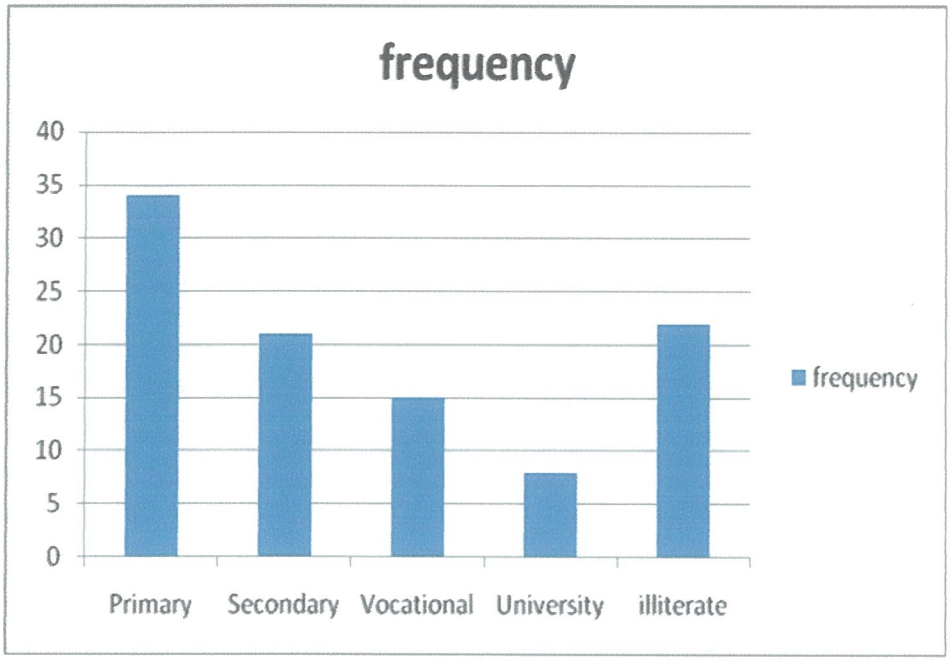
Table 1 above shows that, Most responses were generated from those aged 26-35 (44%) and 15-25 (25%) and least amongst those aged 56 and above generating least response (4%).This indicated that the most affected age group in terms of water availability are those aged less than 35years.Its even likely that this age group may not be instrumental in decision making in the district which might explain why the problem is escalating

Table 2: education level of respondents

Level	**Frequency**	**Percentage (%)**
Primary	34	34
Secondary	21	21
Vocational	15	15
University	08	08
Illiterate	22	22
	100	100

Source: from field by researcher

Figure 2: education level of respondents



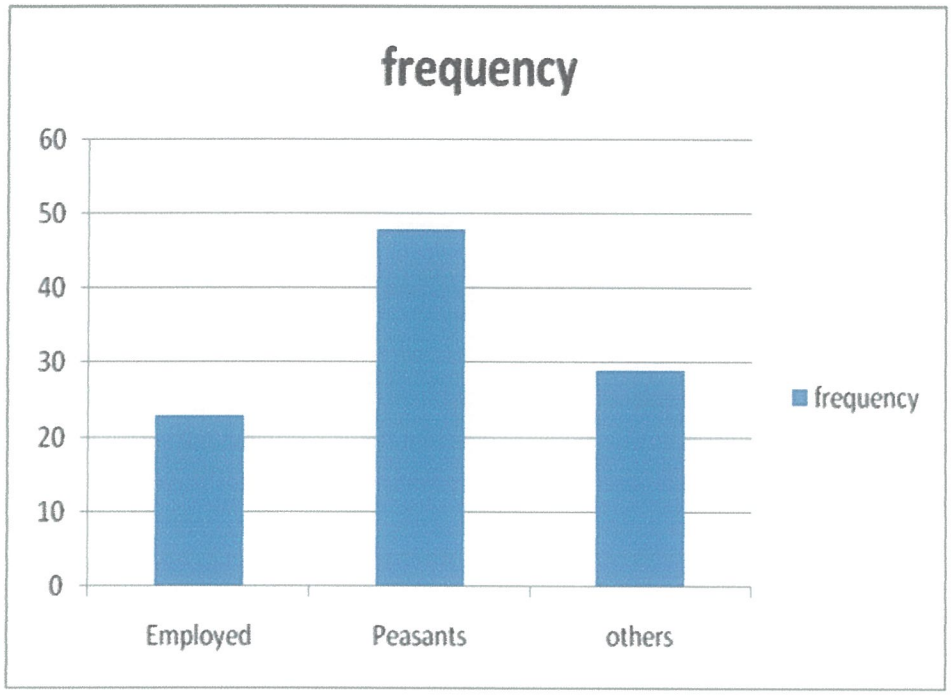
More than 50% of the respondents have attained primary and below level of education that is primary (34%) and illiterate (22%) which is of effect to water use and management, in terms of protection of water sources. Very few respondents attained university level of education (8%) as clearly indicated in table 2.This could have an influence in water availability and management in the district since for one to participate in policy making has to have gone to school and attained a qualification otherwise their decisions are only sought when the condition worsens

Table 3: occupation of respondents

Employment	**Frequency**	**Percentage (%)**
Employed	23	23
Peasants	48	48
Others	29	29
	100	100

Source: from field by researcher

Figure 3: occupation of respondents



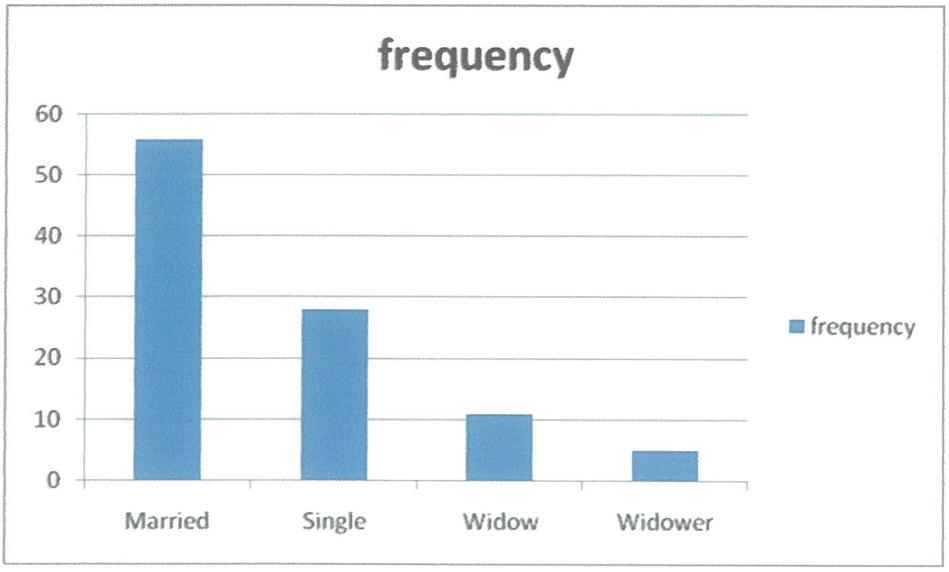
In table 3 above, About 48% of the respondents are peasants or dependants (others) amounting to 29% and a few of the respondents are employed/earning (23%) .These means they are in desire need for water in terms of domestic use and for irrigation

Table 4: marital status

Status	**Frequency**	**Percentage (%)**
Married	56	56
Single	28	28
Widow	11	11
Widower	5	5
	100	100

Source: from field by researcher

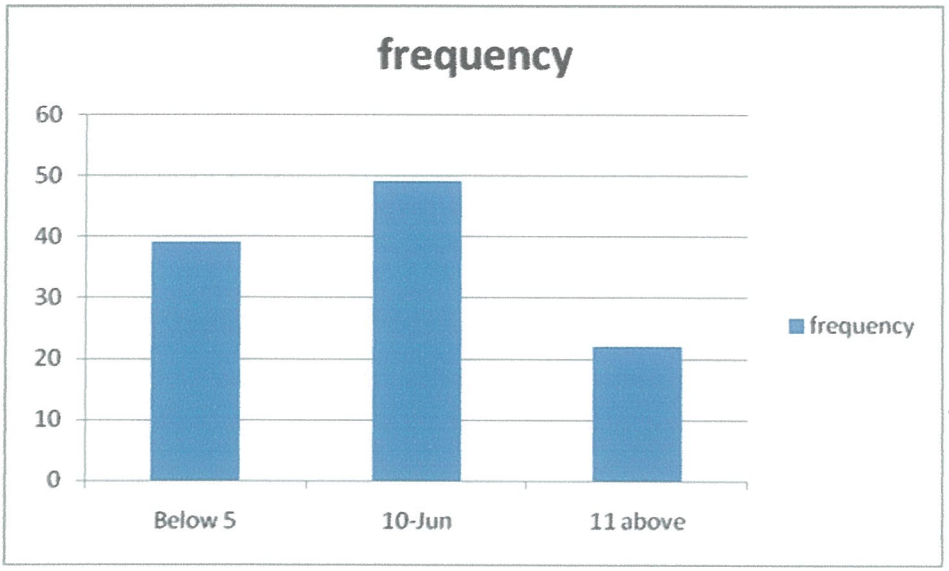
Figure 4: marital status



The researcher engaged a greater percentage (56%) of the married couples (table 4) and less responses from the widows and widowers (11% and 5% respectively).This means that most responses came from respondents who were directly or indirectly affected by the issues of water availability , use and time spent in a water source is concerned they are inconvenienced

Table 5: population

Numbers of individuals	**frequency**	**Percentage (%)**
Below 5	39	39
6-10	49	49
11 above	22	22
	100	100



The population in this community is growing at un promising rate where by a big percentage (49%) of the households had about 6-10 people an indication that about half of the households in this district has many individuals which explains the population and its relationship with the resources such as water availability. With the population increasing at that rate means there is need for more sources of water that are safe for humanity to be healthy and able to produce to support its population now and in time to come

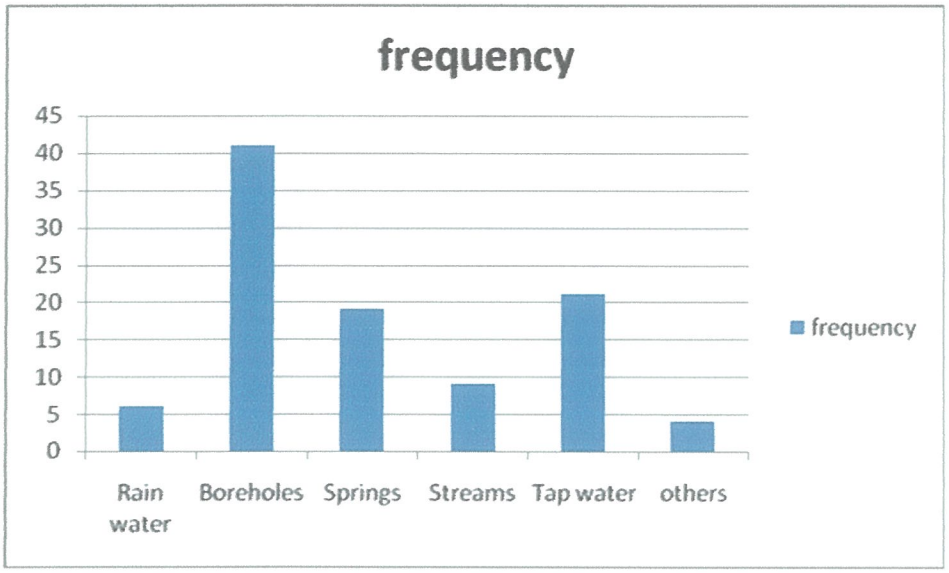
4.1 The water sources

Table 6: water sources

Source	frequency	Percentage (%)
Rain water	06	06
Boreholes	41	41
Springs	19	19
Streams	09	09
Tap water	21	21
Others	04	04
	100	100

Source: from field by researcher

Figure 6: water sources



All 100 respondents answered a question on the types of water supply available. Boreholes and tap water (41% and 21% respectively) were the main sources in the district, with the third being springs (19%). An increase in piped water supply (21% in table 6) over the period refers almost entirely to the urban areas of town council. Regarding the quantity of water available over the years as a whole, there is reported to have been a decline in 83 cases, no change in 16, and an increase in one instance(100).Greater seasonal variation in water supply was noted in 71 cases, no change in 21, and less seasonality in 8 cases (100 replies).The single case of increased quantity and 2 of the 5 instances of decreased seasonal variation were due to the provision of piped supply, and in general there appears to have been a marked deterioration in the availability of water over a period of 15years.The reason mentioned most often for this deterioration was increased climatic aridity, and also 10 people gave vegetation change in catchments as a possible cause. Water quality was said to have declined in 66cases,shown no change in 22 cases, and improved in10 cases (98respondents).The latter were all related to the provision of piped water supply. From table 6 above, it is observed that the main source of water for most households in Garrissa District is borehole water (41%) which is not in line with the water and sanitation

performance report (2005).It stated that challenges for the provision of safe water and sanitation are getting harder due to rapid population growth, increased urbanization, increased industrial activities, poverty especially in urban slum areas and the increasing habits of environmental degradation.

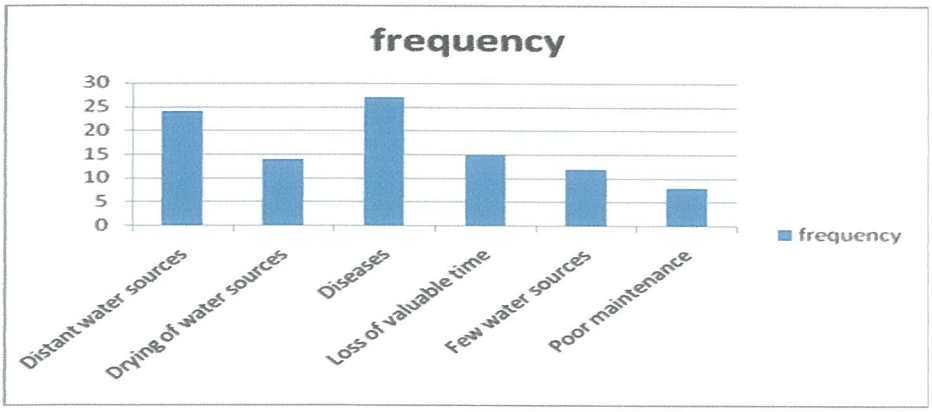
4.2 Problems associated with water availability

Table 7: Problems associated with water availability

Problems	Frequency	Percentage (%)
Distant water sources	24	24
Drying of water sources	14	14
Diseases	27	27
Loss of valuable time	15	15
Few water sources	12	12
Poor maintenance	08	08
	100	100

Source: field by researcher

Figure 7: problems associated with water availability



Some respondents revealed that the major constraints in accessing water in a decreasing order were; diseases (27%), distant water sources (24%), loss of valuable time (15%), drying of water sources (14%), few sources (12%) and poor maintenance (08%)

The study revealed that diseases were one of the biggest hardships in this community due from travelling long distances to fetch water, many hours spent in the water source, unsafe nature of drinking water because of poor management of human excreta and the general water related diseases. The study indicated that the estimated walking distance to the nearest public water source is between 2km to 4km. Never the less, 21.8% of the respondents revealed that some household members walk far long distances more than 5kms.

This is yet in gross contradiction to the national water policy (1997) which sets a walking distance to the nearest water source to be 20 meters. According to the World Health Organization (WHO) some countries have a problem of access to clean water. In Mali, for example 88% of the population lacks clean water. In Ethiopia it is 94%. Rural people often have less access to clean water than do city dwellers. Causes of water shortages include natural deficits, over consumption by agriculture and industry, and inadequate funds for purifying and delivering good water. Also, more than two thirds of the world's households have to fetch water from outside the home. This is a heavy work done mainly by women and children, and sometimes taking two hours a day.

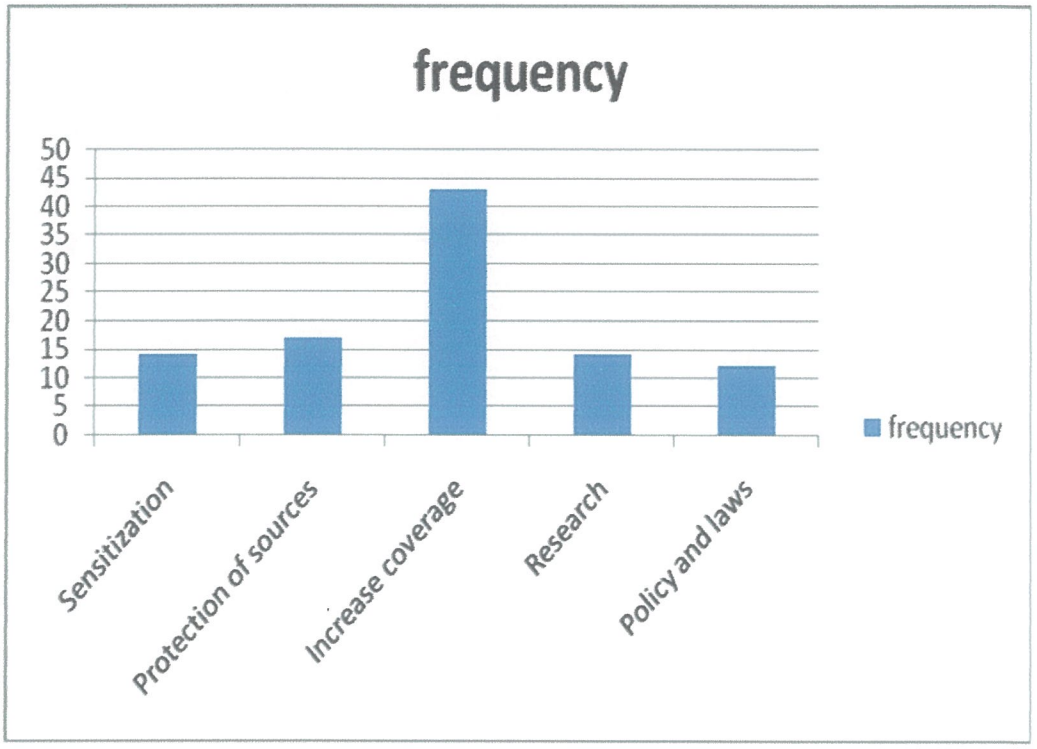
4.3 Measures to ensure proper water availability and supply

Table 8: measures to proper water availability and supply

Measures	Frequency	Percentage (%)
Sensitization	14	14
Protection of sources	17	17
Increase coverage	43	43
Research	14	14
Policy and laws	12	12
	100	100

Source: field by researcher

Figure 8: problems associated with water availability



About (43%) of the respondents mentioned need for increased water coverage as one of the measures that the district needs to address in order to ensure water is available and this would reduce the distance travelled to collect water and the time spent in the water source which is in line with what DFID 1998 put forward that, Women and children are the main victims, Burdened by the need to carry water containers long distances every day, they must also endure the indignity, shame and sickness that result from lack of hygienic sanitation. The impact of deficient water and sanitation services falls primarily on poor unreached by public services, People in rural and peri urban areas of developing countries make their own inadequate arrangements or pay excessively high prices to water vendors for meager wage supplies.

Their poverty is aggravated and their productivity impaired, while their sickness puts severe strains on health services and hospitals.

Also, the need for research in water sector is an old issue as was also reflected by IDWSSD that,

Water supply and sanitation rose up the development agenda more than 20years ago. The 1977 UN water conference in Mar del Plata, Argentina, recommended that the 1980s should be proclaimed the international drinking water supply and sanitation decade (IDWSSD) .In preparation for the launch of the decade, the World Bank and the World Health Organization (WHO) carried out rapid assessments of the water supply and sanitation sectors in more than 100 developing countries. Meaning research remains necessary if any strategy regarding provision of water that is adequate for humanity to survive on is to succeed

There is need to conduct awareness creation and sensitization of the communities if the millennium development goals are to be achieved by the set date as noted below as one of the remedies which is in line with the study findings that; According to the United Nations MDGs, safeguarding human health, including reduction in the mortality rate (associated with lack of access to safe drinking water, inadequate sanitation and poor hygiene) by improving the quality of drinking water. Bringing about behavioral changes in water, in sanitation and in water quality management and sanitation practices. Important milestones are 35% reduction in the incidence of water –borne diseases by 2010, and 70% reduction by 2015 reduction of the mortality rate among children under five by two thirds through improved access to safe drinking water, adequate and affordable sanitation and improved hygiene practices by 2015

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0 Conclusion

Generally, the communities in Garissa district fetch their water from majorly boreholes contributing about (41%) of the domestic water used in the district. Other water sources included; tap water (21%), springs (19%), streams (09%) and others (04%)

Water supply and availability in Garissa district is one of the great setbacks to the development in the whole district this is so because of the distance travelled to collect water, drying of water sources, diseases, time spent to fetch water, few sources of water and poor maintenance of the existing water sources that affects greatly the performance of majorly women and children who are charged with the responsibility of collecting water in the house hold.

However, this can be overcome through interventions such as sensitization of the communities on issues concerning water availability, use of by-laws, improving water coverage, maintenance and protection of the existing water sources together with research on things to do with water availability.

5.1 Recommendation

Much as the district is trying its best to adequately reach piped water to every place, in the district, there is need for development of water master plan by the district that will address the wider aspects of water resources development beyond just water supply. The plan should emphasize water shed management that is, there is need to establish water source protection so as to reduce the effects of poor land management practices on the water quality.

There is need for the district administration to sensitize communities on issues pertaining the available water sources, how to reduce water related diseases ,protection of water sources and the laws on water supply such that communities are informed of what they are entitled to and their roles and responsibilities

REFFERENCES

Altaf, M.A and Hughs, J.A (1994)"Measuring the demand for improved urban Sanitation services: Results of a contingent valuation study in Ouagadougou, Burkina Faso," Urban studies, Vol.No 10.

Altat, Mir Anjun, Haroon Jamal, and Dale WhiHington (1992) Willingness to pay for Water in Rural Punjab, Pakistan. UNDP-World bank Water and Sanitation Program, Washington, D.C.

Bolt, Eveline, and Christine Van Wijk-Sijbesma (1992) "Women Water and Sanitation" Abstract Journal .The Hague, the Netherlands: IRC International Water and Sanitation center and PROWESS/UNDP.

Briscoe, John and David de Ferranti (1998) Water for Rural communities: Helping people help themselves. Washington, D.C. World Bank.

Cairn cross, S. (1992) Sanitation and Water supply: Practical Lessons from the Decade, UNDP-World Bank, Washington D.C.

Cotton, A and Say well. D (1998a) Strategic Sanitation Approach: A review of Literature, WEDC, Lough Borough University.

Directorate of Water Development, the water quarterly, Vol 1.No.1 September 2003.

Edwards, D.B and Salt.E.(1992)Making choices for sectoral Organizations in Water and Sanitation, WASH Technical Report No.74,Water and Sanitation for Health Project, Washington D.C.

FINNIDA (1993) Looking at Gender, Water supply and Sanitation, Finnish International Development Agency, Helsinki.

Franceys, R, Pickford, J.A and Reed, R.A. (1992) A guide to the Development of onsite Sanitation, WHO, Geneva.

Global Consultation on Safe Water and Sanitation for the 1990`s, New Delhi, India.

Harday, J.E, Cain cross, S and SatterthWaite .D. (eds) (1990).The poor die

Young, Earth scan, London.

Mara, D.D. (1996)"Health impacts of Drainage and Sewerage in Poor urban areas in Salvador", PhD Dissertation in the Department of Epidemiology and Population Sciences, London School of Hygiene and Tropical Medicine. University of London

The State of Environment of Uganda, 1994

The WEHAB Working Group (August 2002), A frame Work for Action on Water and Sanitation

WHO (1983) Minimum Evaluation Procedure (MEP) for Water supply and Sanitation Projects, WHO, Geneva.

Winblad, U. and Kilama, W. (1985) Sanitation without Water (Revised and enlarged edition) Macmillan, London.

White, A. Guidelines for Planning Community Participation Activities in Water supply and Sanitation, Geneva, World Health Organization ,1986,WHO offset publication No.96.

World Bank (1997) Toolkits for Private Participation in Water and Sanitation, World Bank, Washington, D.C

Wright, A.M (1997).Towards a strategic Sanitation Approach: Improving the Sustainability of Urban Sanitation in Developing Countries, UNDP-World Bank, Washington, and D.C.

APPENDIX I

TIME FRAMEWORK

TIME FRAME WORK	
Period	Activity
December-January	Proposal writing
February- April	Data allocation and compilation
May	Handing of the Dissertation

APPENDICES III

RESEARCH QUESTIONNAIRE

I am Abdulahi Abdi Hajji, pursuing a degree of Bachelor of Science in Environmental Management of Kampala International University. Am carrying out Research on an assesment of Water availability and the Community health in Garrissa district. I will be grateful if the highest level of cooperation is exhibited by you my dear respondent. The information you provide shall be confidential.

RESEARCH TOPIC

THE ASSESSMENT OF WATER AVAILABILITY AND THE COMMUNITY HEALTH IN GARRISA DISTRICT, KENYA

(Tick in the boxes for each question and fill in the spaces provided)

RESPONDENTS BACKGROUND

1. Sex: male ☐ female ☐

2, Age interval: 15-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56+ ☐

3. What is your level of education?

Primary ☐ secondary ☐ vocational ☐ university ☐ N/A

4. What is your occupation?

Peasant ☐ employed ☐ others ☐

5. Marital status:

Married ☐ single ☐ widow ☐ widower ☐

6. How many are you in this home?

Lessthan5 ☐ 6 to 10 ☐ others .....

SECTION A

WATER SOURCES, THE AVAILABILITY AND MANAGEMENT

7. What are the major sources of water in this community? .....

.....

8. What is the distance from this home to the nearest water source? .....

.....

9. At what times of the day do you fetch water? .....

.....

10. What means do you use for carrying water from the water source?

.....

11. How much water do you use per day? .....

12. What do you use this water for? .....

22. What are their roles? .....

23. Are there any by-laws regarding abuse of a water source? Yes ☐ No ☐

If yes, which ones? .....

If no, why? .....

24. What is the government's contribution towards water provision in this community?

.....

25. Apart from the government who else helps you in issues concerning water?

.....

26. In your point of view, what do you think can be done to improve the water supply in your community? .....

.....

.....

.....

Thank you for your time and information. God bless you.