EFFECT OF DOMESTIC WATER SUPPLY ON POVERTY IN KILOLO DISTRICT, IRINGA TANZANIA

BY

SIMON ELIOTH MDENDE

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN RURAL DEVELOPMENT OF SOKOINE UNIVERSITY OF AGRICULTURE.

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ABSTRACT

This study on “Effect of Domestic Water Supply on Poverty” was conducted in four villages of Kilolo District in Iringa Region. The overall objective of the study was to determine the effect of domestic water supply on poverty in Kilolo District. A cross-sectional design was adopted whereby purposive and simple random sampling methods were used to obtain 120 respondents, sixty each from water rich and water scarce villages. A structured questionnaire was used in data collection and checklist for collecting information from key informants. The collected data were statistically analyzed to obtain frequencies, means and percentages. The study findings show that only 37.5 % of sampled households were located within 400 metres to water sources. Households situated within 400 metres to water sources earned a mean annual income of 1 416 367 Tshs and those beyond 400 metres to water sources earned mean annual income of 910 307 Tshs. In water rich villages, during dry season women spent an average of 150 minutes per day on collecting domestic water while women from water scarce villages spent an average of 508 minutes per day. Long distance to water sources, unreliable water sources within the villages and lack of knowledge of rain water harvesting and storage techniques were identified by respondents as the major causes of insufficient domestic water supply. The study recommended that the district should include rain water harvesting plan as one of the strategies for improving water sources at village levels. Water supply systems should be developed at village levels by cost sharing basis between the government, communities and donors. For sustainable management of rural water supply systems, the government and agencies concerned should put emphasis on both technical and

community building capacity. The approaches will contribute the efforts to meet the target of supplying domestic water to the majority of households within 400 metres.

DECLARATION

I, **Simon Elioth Mdende**, do hereby declare to SENATE of Sokoine University of Agriculture (SUA) that this dissertation is my original work and that it has not been submitted for a high degree at any University.

_____ _____

Simon Elioth Mdende Date

(MA Candidate)

The above declaration is confirmed

_____ _____

Dr. Lazaro, E.A Date

(Supervisor)

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

BTC	Belgian Technical Corporation
CED	Christian Engineers in Development
DANIDA	Danish International Development Agency
DED	District Executive Director
FAO	Food and Agriculture Organization
IFAD	International Fund for Agricultural Development
IGAs	Income Generating Activities
IRC	International Research Centre
IWMI	International Water Management Institute
KDC	Kilolo District Council
MDGs	Millennium Development Goals
MKUKUTA	Mpango wa kukuza uchumi na kupunguza umaskini Tanzania
NBS	National Bureau Statistics
PHDR	Poverty and Human Development Report
PRSP	Poverty Reduction Strategies Paper
SNAL	Sokoine National Agricultural Library
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
Tshs	Tanzanian shillings
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United National Educational, Scientific and Cultural Organization

UNICEF	United Nations Children's Fund
URT	United Republic of Tanzania
WHO	World Health Organization
WWAP	World Water Assessment Programme
WWC	World Water Commission

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

Poverty is a worldwide problem, particularly in the Third World Countries (World Bank, 1997). Poverty is a state of deprivation and prohibitive of decent life that results from many mutually reinforcing factors including; lack of productive resources to generate material wealth, illiteracy, prevalence of diseases, discrimitive socio-economic and political systems and natural calamities, such as drought, floods, HIV/AIDS and wars (URT, 1999). In developing countries, more than 1.2 billion live in extreme poverty; they spend less than one US dollar a day per person to meet basic needs (URT, 2003). The rural poor make up more than 75% of the poor in many Sub-Saharan African and Asian countries (FAO, 2001). According to Aureli and Brelet (2004), women are more vulnerable than men when it comes to poverty. They attributed this to poor gender mainstreaming particularly in households resources ownership, control and use as well as poor division of labour at household level. Most valuable resources were found owned by men .Women constitute 70 per cent of the poorest people in the world as found by Aureli and Brelet (2004). Reducing poverty in developing countries is the most persistent challenge facing the world today. The Governments and civil societies of developing countries are in the forefront of the battle to reduce poverty and thereby achieving equitable and sustainable development (World Bank, 1997).

The relationship between water and poverty is as complex as poverty itself. There are no easy solutions, but urgent action is needed where the poor face problems on water scarcity. The starting point is to build from the capabilities and assets that poor rural communities

possess. These poor communities have clear views of both the challenges they face and the solutions to which they aspire (UNEP, 2001). Listening to the voices of the poor rural is a central theme of the initiative towards improving water supply which in turn will facilitate the efforts for poverty reduction (UNEP, 2001).

World Bank (2004) found that, Poverty is often linked to deprivation from water in sufficient quantity and quality for normal domestic, industries and farming. In rural areas of developing countries, everyone uses water for various ‘domestic’ purposes and many people use or could use water for ‘productive’ purposes to earn an income, such as gardening, field crops, livestock, and brick making (Butterworth and Moriarty, 2004).

Under favorable conditions, the study findings conducted in India indicate that, women have a great contribution to poverty reduction in various ways such as women provide income to the family in four ways: by doing agricultural work on the land of the household, by engaging in expenditure-saving activities e.g. fodder collection and vegetable gardening, by hiring themselves out as daily wage labourers, and by doing micro-enterprise work (IRC, 2001). Those women favoring conditions included; a reliable improved water supply with amounts of water and predictability of delivery adjusted to women’s needs and a micro-enterprises support programme that goes beyond training, but covers the whole range of requirements and assists the micro-enterprises to pool their resources for crucial higher level services, such as training, quality control, marketing, market research, and market capital as another encouraging condition for women to engage in the battle of poverty reduction (IRC, 2001).

Deprivation from access to water for various uses is a real obstacle that prevents poor people from fulfilling their basic income needs and escaping income poverty (World Bank, 1997). The poor, most of who live in rural areas, have limited access to clean water for domestic use, crop production and adequate sanitation (World Bank, 2004). It has been estimated that more than 2 billion people are affected by water shortages in the world; 1.1 billion do not have sufficient drinking water and 2.4 billion have no provision for sanitation (WHO/UNICEF, 2000). The outcome can mean increases in diseases, poorer food security, conflicts between different users and limitations on many livelihood and productive activities (WHO/UNICEF, 2000).

In most of the developing countries, natural resources studies have been mainly focused on resources of direct economic interest like oil, metal ores, hydropower and the like (Falkenmark, 1990). Water plays a crucial role in systems; therefore, there is a need to be integrated in natural resource studies (Falkenmark, 1990). The central importance of water to life processes prompts the plausible hypothesis that socio-economic development would be particularly difficult to achieve in countries where there is no easy access to water neither for plants nor for humans (Falkenmark, 1990).

According to Tanzania Household Budget Survey 2000/2001, about 50% of the population of Tanzania is defined as poor and 36% as absolutely poor (NBS,2002). In Tanzania, soon after independence in 1961, the expansion of water supply was among the initiated extensive programmes related to poverty eradication (URT, 1998). About 50% of the rural population had access to reliable water supply services in the country (URT, 2002a). However, due to poor operation and maintenance, over 30% of the rural supply schemes

are not functioning properly (URT, 2002a). In such situation, the people, especially women and girl-children, walk long distances to fetch water (Aureli and Brelet, 2004). Based on projected population from estimated 32 million in year 2001 to about 59.8 million by year 2025, the growth in population will have a significant impact on domestic water supply and sanitation services if proper measures are not undertaken (URT, 2002a). Turton and Warner (2002) agued that, in a situation where water resources are relatively finite within any given country, doubling of that country's population will cut into half the volume of water available per capita.

Moreover, the Tanzania Household Budget Survey 2000/2001 indicate that, 29 percent of the population in Kilolo District is below the poverty line and the number of poor people per Square Kilometre is seven. The poverty situation is likely to be associated with water scarcity because women as the majority producers spend more hours per day on fetching water rather than on economic activities. Therefore, research on the effects of domestic water supply on poverty becomes a vital study with the anticipation that, access and better management of water can make a key contribution to poverty reduction particularly to rural population.

Both developed and developing countries are faced by water crisis, but the problem is more adverse in Third world countries compared to developed world (World Water Commission, 2000). Water scarcity refers to economic, social, or environmental problems caused by unmet water needs (Tatlock, 2006). Water scarcity occurs when demand exceeds supply due to mismanagement of water sources, disruption in distribution,

contamination, natural causes, population growth or widespread practices that consume excessive amounts of water (World Water Forum, 2000; UN, 2006).

Globally 1.1 billion people lack access to safe drinking water, 2.6 billion people are without improved sanitation and 1.8 million people die every year from water associated diseases, including 90% of under five children (World Water Commission, 2000). Around 1.7 billion people live in countries that are water stressed (Soussan and Arriens, 2004). In the year 2000, an average of two out of ten people from developing countries were lacking access to safe water and five people out of ten people were without improved sanitation (UNDP, 2001).

While water scarcity occurs throughout the world, no region has been more afflicted than Sub-Saharan Africa (UNEP, 2001). The UN Environment Program (UNEP) compares water scarcity and quality today with a projection for the future: Currently, access to safe water in Sub-Saharan Africa is worse than any other area on the continent, with only 22 percent to 34 percent of populations in at least eight Sub-Saharan countries having access to safe water. In East Africa, statistics show that only 49% of rural Kenyans have access to safe water (WWAP, 2006a). In Uganda about 58% of rural population have access to safe water supply (WWAP, 2006b) while in Tanzania only 53% of rural population has access to water services (URT, 2005b).

According to UN medium projection, in 2025 the population on the earth will be 7.8 billion, a 38 percent increase of the present (2001) level (UNEP, 2001). Water resources on the other hand, are decreasing at an alarming rate (Molden and Sakthivadiel, 1999). A

study by IWMI (2000) projects that by the year 2025; 1.8 billion people will live in countries or regions with absolute water scarcity. Furthermore the UNEP (2001) projects that in the year 2025, as many as twenty-five African nations (5.5 million people) roughly half the continent's countries are expected to suffer from a water shortage if measures are not undertaken

Water resources in the country include rivers, lakes, wetlands, springs, reservoirs and groundwater aquifers; and many water bodies that are shared with neighbouring countries. More than half of the country receives on the average less than 800mm of rain per year (URT, 2002a). According to the National Water Policy, Tanzania's annual renewable water resource is about 89 cubic kilometres or 2700 cubic meters of water per person per year (URT, 2002a). Based on the Tanzania projected population from estimated 32 million in year 2001 to about 59.8 million by year 2025, annual average available water per capita will be reduced by 45% to about 1500 cubic meters per person per year (URT, 2002a). This show that the country will face a water stress situation if appropriate measures are not made, considering that below 1700 cubic meters per person per year signifies water scarcity (URT, 2002a).

Estimates of domestic water supply services done by the Ministry of Water and Livestock Development in 2002 indicate that, the coverage for municipal and industrial water supply is 73 % in urban areas and rural water supply is only 50% (URT, 2002a). Around 30% of the rural water schemes are not functioning which in turn can affect the households accessibility to improved water sources (URT, 2001). Another estimate done by Tanzania poverty reduction strategy (PRSP) (URT, 2000), show that about 68% of the

urban population has access to piped water, while in rural areas only 48.5% of the population has access to safe water sources (tap water and protected shallow wells). This coverage in the provision of safe water particularly to rural areas is undesirably low (URT, 2002a). World Bank (2006) data show that between 2000- 2004 about 73 percent of population in Tanzania had sustainable access to improved water sources. A relatively larger proportion in urban 92% and 62% in rural areas. The people, especially women in most rural areas, walk long distances to fetch water for their respective families. This affects the time needed to perform other social and economic activities.

1.2 Problem Statement

About 29% of the population in Kilolo District, like in most other rural areas, is poor (URT, 2005b). Partly, this is associated with illiteracy, poor health services and access to very limited resources. According to Christian Engineers in Development (CED) (2002), the populations in Kilolo typically suffer from limited access to domestic water– both of safe quality and adequate quantity. A great many of these poor men and women, in rural settings base their livelihoods on ‘informal activities’ like small-scale cropping, livestock keeping, agro-processing and other micro-enterprises. In most of these activities an adequate water supply is a crucial enabling resource: as a resource used in or necessary for the activity itself; as a provider of time (by reducing time spent collecting water); or as a key element in improved health that enables people to do work (WHO, 1996). Taken together then, water supplies provided to households, and particularly the poorest population, have a huge potential to impact on poverty (Soussan, 2003).

Availability of clean and safe water supply and sanitation is one of the basic indicators of human development (WHO, 1996). Unluckily, water for the majority of households in the district is not within easy reach. The Government, Non-Government Organizations (NGOs) and other donor agencies have been supporting water supply services; yet the proportion of households using improved water sources (piped and protected) in Kilolo District in Iringa Region is only 48 per cent (URT, 2005b).

In most of the developing countries including Tanzania and Kilolo District is not exclusion, the impact of water scarcity has been particularly adverse on women and girl-children who are culturally and traditionally responsible for fetching water (FAO, 1996). Women spend many hours per day for gathering water from distant sources. That time could be spent on performing farm and off-farm income generating activities, which in turn build up rural households capacity towards poverty reduction and the nation at large (IFAD, 2001). Despite the increase of water burden encountered by the population particularly women and girl-children, still the community of Kilolo District lacks empirically information on the effect of domestic water supply on poverty. Thus, the study aims to determine the effect of access to domestic water supply on poverty.

1.3 Problem Justification

The Millennium Development Goal Number 7 stipulates a target to halve by 2015, the population of people without sustainable access to clean and safe drinking water and basic sanitation (UN, 2000). The 2025 Development Vision for Tanzania, which aims at achieving a high quality livelihood for its people, attain good governance through the rule of law and develop strong and competitive economy, recognizes the importance of water resources in the attainment of this vision (URT,2000). Water is regarded as a main

ingredient in poverty reduction through ensuring food security and self-sufficiency among other things (URT, 2000). “Improved health and alleviate poverty of rural population through enhanced access to adequate, safe and clean water” is the ultimate objective of the rural water supply sector (URT, 2002a). Similarly the problem is also inline with the National Strategy for Growth and Reduction of Poverty (NSGRP) as stipulated in Cluster II: Increased proportion of rural population with access to clean and safe water from 53% in 2003 to 65% in 2009/2010 within 30 minutes of time spent on collection of water within a distance of not more than 400 metres from home to water sources (URT, 2005b). The aforementioned policies and targets are meant for solving the problem of poverty of rural people through ensuring sustainable access to clean and safe water. Therefore, this research is worth undertaking so that the relationship between domestic water supply and poverty among rural population can be empirically determined. The study also determines the causes of insufficient domestic water supply at household level. Investments in domestic water supply for the poor are productive potential because they have high rates of return in not just social and health but also in economic terms (Soussan, 2003).

The findings of this research is anticipated to be helpful for the Kilolo District, the Government in general and other relevant stakeholders in forming suitable strategies for enabling sustainable access to adequate, safe and clean water. It is hypothesized that improving water security of poor people particularly rural population will help to reduce poverty through increasing time spent in agricultural and non-agricultural income generating activities instead of spending much time on collecting water from distance sources.

1.4 Research Objectives

1.4.1 General objective

The general objective of this study was to determine the effect of domestic water supply on poverty among rural population in Kilolo District.

1.4.2 Specific objectives

i) To determine the proportion of households within 400 metres to water sources

ii) To determine the proportion of time spent by women on collecting water for domestic purposes per day.

iii) To compare income between households within 400 metres and those beyond 400 metres to water sources.

iv) To determine the causes of insufficient household domestic water supply in Kilolo District.

1.5 Research Hypothesis

The hypothesis tested in this research was**:**

Incomes of rural households within 400 metres to water sources differ significantly from those households beyond 400 metres to water sources.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Women and water scarcity

Water is for all life, including for human life (UN-Water, 2007). More than one billion people are deprived of access to water of sufficient quantity and quality to meet minimum levels of health, income and freedom from drudgery (UN-Water, 2006). In developing countries particularly in rural areas, that water scarcity affects mostly women and girls who often bear the burden of hauling water for household domestic purposes (UNESCO, 2002). Study by UNDP show that, women and girl-children are primarily who bear the daily burden of hauling heavy buckets long distances to meet the domestic water needs for their families (UNDP, 2006). The women and girls burden of water is time-consuming and physically debilitating chore reduces the time available for productive activities and, for girls, to attend school (UNDP, 2004). Inadequate access to domestic water supply encompasses a number of undesirable effects such as spending more time on gathering water instead of performing economic activities (FAO, 2001). In some parts of Africa, women and children spent eight hours per day collecting water (UN-Water, 2007). Water related diseases such as cholera and diarrhea affect millions of poor, drop out of girl-children from school, using much money for water services (Sousan, 2002).

The study findings conducted in India show that, on average, women spent 3 hours of their 15 to 16-hour working day to fetch water. Daughters spent nearly 1.5 hours, sons 12 minutes, and husbands 15 minutes per day. In other words, on average a household spent nearly 5 hours a day on collecting water. When the piped water supply breaks down

women need to spend substantially more time on fetching water: 2.54 hours and 2.30 hours in summer and monsoon respectively. Most of this time comes at the cost of time spent on income generating activities, 1.56 and 1.48 hours in summer and monsoon respectively. The extra time spent is in spite of the fact that people have to buying water and do not bath (IRC, 2001).

To further substantiate these findings, some additional data were collected on how women would allocate time savings from an improved water supply. It was found that the women would allocate 72% of these time savings to income generating activities, providing that sufficient economic opportunities are available. This underlines the need for integrated approaches towards poverty alleviation in semi-arid areas that addresses water supply as well as micro-enterprise development (IRC, 2001).

2.2 Means of domestic water transport

A study in Zambia found that women spend more than 800 hours per year collecting water; men on the other hand spend less than 50 hours per year (Malmberg -Calvo, 1994). Women also spend much of their time traveling often on foot because of poor transportation systems. Likewise a World Bank study found that 87 percent of travels in rural Africa takes place on foot, and within these households' women are more likely than men to be doing the walking such as collecting firewood and water for their families (Malmberg -Calvo, 1996). A great deal of the energy and time of rural women is spent on the transport of domestic requirements (water, firewood, food grains, shopping) as well as of farm produce and traded goods (World Bank,2004). According to Fernando (1997) much of the transport burden of women is unaided by simplified machines such as

bicycles and motor power instead on head, animals are mainly used. Transport systems based on animal energy can have several social and economic benefits for women and communities (Fernando, 1997).

Donkeys are valuable transport animals in semi-arid and mountainous areas. Although they are small (compared with cattle, horses and camels) they can be used for riding, pack transport and pulling carts (Starkey and Starkey, 1997). Donkeys are generally inexpensive, tolerant to disease (in dry zones) and of low risk (they are seldom stolen) (Starkey, 1994). A study by Starkey and Starkey (1997) indicate that donkeys are easy to manage and train and are particularly appropriate for small-scale transport operations. In areas where cattle have succumbed due to drought, donkeys have been instrumental in allowing rural communities to continue to survive and produce.

Donkeys have often been associated with poverty (unlike cattle, camels and horses). Despite their low status donkeys have played an important role in the lives of the poor, particularly poor women. Women are often major beneficiaries of donkey energy, used for household and farm transport, riding and/or trading (Starkey and Starkey, 1997). The tiring and time consuming tasks of transporting domestic requirement can be greatly relieved using animal energy. The woman gains important time, while children often find driving an animal-drawn cart is as much a recreation as a household duty (Mutharia, 1995).

2.3 Domestic water requirement per capita

A domestic water supply is an essential requirement for all people. People use water for a wide variety of activities. Some of these are more important than others, for example,

having a few litres of water to drink a day is more vital than washing clothes, but people will need to wash if skin diseases are to be prevented and physiological needs met (WHO, 1992). According to WHO (1992), domestic water uses divided into three categories: i) consumption uses include cooking and drinking, ii) hygiene uses include bathing, washing dishes and clothes, cleaning and toilet uses iii) productive uses include consumption by domestic animals (cattle, goats, pigs and sheep), brewing beer and brick making. The first two categories are the most basic domestic water uses at household. This is often measured in litres per person (capita) per day (Lpcd) (WHO, 1992). An average household in developing countries consumes about 40-60 litres of water daily for household purposes including drinking, cooking, cleaning, personal hygiene (WHO, 1992). Meeting this need usually entails several trips for women and children to water-collection points, sometimes involving several hours (WHO, 1992).

Type of water access, storage capacity, water expenses and participation in water related activities differs between water rich and water scarce locations. The cost of water depends on the household water use and collection strategy (Butterworth & Mokgope, 2001). Households participating in income related water activities incur relatively higher water expenses. High cost of water during the dry season, discourage participation in income related water activities (Butterworth & Mokgope, 2001).

Study by Lewis (1994) indicate that, people's needs are not always predictable. Different sexes have different priorities, fore example, with women being concerned about basic household needs at the top of the hierarchy, men perhaps having a concern for livestock, girls needing water to wash during menstruation and boys wanting to go for a swim

(Lewis, 1994). Human water consumption varies considerably according to the availability of water and the standard of living of the people (Lewis, 1994). Depending on the climate and work load, between 3 and 10 litres of water per day are essential to meet a person's basic drinking and food preparation requirements (Lewis, 1994). The amount of water used for other purposes varies widely, but much larger quantities are needed for personal hygiene, cleaning of cooking utensils and laundry. According to WHO the normal standard water requirement per person per day is 25 litres which is equivalent to 6000litres per household per month for a household of eight (8) people (WHO, 1992).

2.4 Household expenditures for water

The majority of people particularly from Third World countries are faced with water shortage problem which lead to increase of households' expenditure for water (WWAP, 2003). According to Merret (2002), households face both direct and indirect costs for obtaining water. Direct costs are monetary costs in the form of water charges, while indirect costs include opportunity costs of time for fetching water from distant places and, in some cases, transportation costs (Merret,2002). Direct monetary costs are mostly incurred for water from the public piped system, private vendors, most boreholes, and sometimes also for wells. The water tariff for the piped system is subsidized and much lower than vendor water (Merret, 2002).

Relative distances to improved and unimproved sources also matters to some extent as it translates into opportunity costs of time for reaching the source. Thus, the provision of more improved water sources to reduce distances is likely to increase households' use of such sources and reduce expenditure on water services

(Whittington *et al*. 1991). The effect of prices and income levels on households' choice of water source differs according to the pricing system used. In particular, price matters where a per-unit price is charged. Under such a system, household behavior is sensitive to the price charged, regardless of income. Price and quality also have a significant impact on the quantity of improved water consumed in these communities (Brookshire and Whittington, 1993). Where a flat rate is charged, income level plays a more important role than price. This is intuitive as the effective per-unit price charged in these communities tends to be low, but the one-time payment required can be problematic for poorer households, particularly in the context of imperfect credit markets. This point the importance of choosing an appropriate pricing system to prevent exclusion of the poor. For example, a flat rate system allowing poor households to pay in installments may be useful to ensure that poorer households are reached (Brookshire and Whittington, 1993).

2.5 Women and poverty

Most domestic water projects are designed and managed to improve welfare and health (Sieber, 1996). Women carries home the domestic water for the family. However in dry areas, where water is a serious development constraint, women uses domestic water for economic purposes (FAO, 1996). This takes much time and energy and restricts the amounts of water used for domestic purposes. A study conducted in Makete, Tanzania, showed that a typical woman spent over four hours per day on water transport tasks (Sieber, 1996). In Beira, Mozambique, women spent seven hours per day on collecting water and fuelwoods for household domestic purposes (Barwell, 1996). In other parts of Africa, transport time ranged from 1 to 2.5 hours per woman per day on collecting water (Barwell, 1996). Therefore; among other factors, inadequate domestic water supply

contributes the existence of poverty particularly to rural population because they spend many hours on water collection rather than on income generating activities (UNDP, 2004).

2.6 Economic benefits of reduced water collection time

The study conducted in Malawi indicate that, if water supply is improved, women as the major responsible group for fetching water spend only one hour per day collecting water ,women could use this time saved either for income generating activities or for domestic, social and developmental activities. The subsequent time gains, calculated on the basis of the time-activity profile, can be allocated either to productive activities or a combination of reproductive and personal activities (Mulwafu, 2003).

Consequently, two alternative upper bounds have been calculated: (1) the maximum additional income a woman can earn assuming time saved is devoted to economic activities; and (2) the maximum time that is freed for personal and reproductive activities. Calculations showed that additional annual income could be between Rs.750 and Rs. 5 520 per woman (depending on the economic options available). Alternatively, each woman might gain between 45 and 152 eight-hour days annually for domestic, social and developmental activities (Mulwafu, 2003). Women contribute to household income through (1) expenditure-saving activities - including working on own agricultural land, and (2) income generating activities - either by hiring themselves out as daily wage labourers, or by doing micro-enterprise work (e.g., handicrafts, dairying, collecting gum or making salt) (Mulwafu, 2003).

2.7 Water and Poverty reduction

Inadequate access to water forms a central part of people's poverty, affecting their basic needs, health, food security and basic livelihoods (Ahmad, 2003). Poverty is no longer seen as a simple lack of income or, at the national level, low per capita Gross National Product (GNP). It is today recognized to be a complex, multifaceted situation that involves both the material and non – material conditions of life (Mehta, 2000).

Many international organizations have put forward new approaches to poverty reduction in recent years, which have important implications for the development of all aspects of life, including key areas of natural resource management such as water (UN, 2000). At national level, experience show that, countries with adequate water supply for domestic, agriculture and industries tend to have high income as compared to those water scarce countries (World Bank, 1992). A detail of that experience is shown in Table 2.

Table 1: Water use and national income

Country	GDP per capita (US dollar) 1990	Annual water per capita		
		Domestic	Agriculture	Total
Tanzania	110	8	28	36
Sri Lanka	470	10	493	503
South Africa	2 530	65	339	404
United Kingdom	16 100	101	406	507
Sweden	23 660	172	307	479
United states	21 790	259	1 903	2 162

Source: World Bank (1992)

The table show that adequate water supply is a paramount important aspect for both domestic and productive purposes. This can lead to increase of income which is a key element towards poverty reduction (URT, 2002b).

In rural areas water resources are used for a combination of basic human needs and productive purpose (Mulwafu, 2003). These economic activities such as vegetable gardens, cattle farming, food vendors, local beer brewing amongst others, are highly dependent on reliable and adequate water supply (Nicol, 2000). Domestic water serves in a wide range of productive uses to secure food and non-food incomes for rural households. It is a productive asset for the poor and economic good, which can be combined with other assets to generate financial and non - financial livelihoods benefits (Butterworth and Mokgope, 2001).

The economic well being of society has so far exerted the greatest demand on the world's water resources (World Water Commission, 2000). One of the major characteristics of poor countries is the lack of adequate or good quality water for domestic basic use (Sousan, 2002). But this should not confuse the fact that people do use domestic water supplies for a wide range of 'non-domestic' purposes. This has become an important mechanism for families to earn money in many developing countries (Kaminga, 1991).

2.8 Water Policies and Targets

Water policies and management has been given attention to the international debates, particularly since the Dublin Conference of 1992, from which emerged the Dublin Statement on Water and Sustainable Development (UN, 1992). Four principles have become the cornerstone of much debate on international approaches to water policies; (i) Fresh water is a finite and vulnerable resource, essential to sustain life, development and environment, (ii) Water development and management should be based on a participatory

approach, involving users, planners and policy makers at all levels, (iii) Women play a central part in the provision, management and safeguarding of water and (iv) Water has economic value in all its competing uses and should be recognized as an economic good (UN, 1992).

In the third World Water Forum held in Kyoto – Japan in 2003, ninety six (96) countries signed an agreement on *"Freshwater is a precious and finite resource central to sustainable development, economic growth, social stability and poverty alleviation"*. At the 2002 World Summit on Sustainable Development (WSSD), among others, the summit agreed that poverty and water scarcity are linked together, therefore fighting poverty must begin with provision of water to the poorest. Thus the summit set a goal to reduce the proportion of people without access to water from two billion in year 2002 to one billion in year 2015 (UN, 2005).

The United Nations (UN, 2005) report agues that improved water management can make a major contribution to poverty reduction. The goals and targets set out in the Millennium Declaration, the MDGs, provide a specific structure for analyzing both directly and indirectly relationship between poverty reduction and water management (UN, 2005). Based on the report, water plays an essential role in achieving the full set of Millennium Declaration goals and targets (UN, 2005). The details are shown in Appendix 4.

Based on water problems facing the world today particularly developing countries, various initiatives towards combating water shortage have been formulated at national and international levels. Some of those initiatives are described in the following policies and strategies:

2.9 Millennium Development Goals (MDGs) and water

The Millennium Development Goal number 7 target 10 aimed to halve by 2015, the proportion of people without sustainable access to safe drinking water and sanitation (UN, 2005). Tanzania is on track to achieving the target of access to safe drinking water (URT, 2006b). Trends towards achieving the target is as follows; in 2000, about 56 percent and 92 percent of rural and urban respectively had access to improved water sources. Fourty two percent and 85% of rural and urban households respectively had access to improved water sources in 2002. In 2005, about 53 percent of rural households and 73 percent of urban households had access to improved water sources (URT, 2006 c).

In Tanzania the target by 2015 is that, about 82 percent of rural households should have access to improved water sources (URT, 2006 c). The major challenge in water provision is on how to improve equitable access especially in rural areas. The country is vast and the majority of the population lives in rural areas. Therefore participatory approach particularly on cost sharing between the government, communities and other stakeholders is a key element towards achieving the target.

2.10 The African Water Vision for 2025

The African Water Vision for 2025 is designed to avoid the disastrous consequences of water scarcity and lead to a future where the full potential in Africa's water resources can be readily unleashed to stimulate and sustain growth in the region's economic development and social well-being (Donkor, 2003).

The shared vision is for: *"An Africa where there is an equitable and sustainable use and management of water resources for poverty alleviation, socio-economic development, regional cooperation, and the environment"***.**

2.11 The Tanzania Development Vision 2025

The Tanzania Development Vision 2025 aimed at achieving a high quality livelihood for its people, attain good governance through the rule of law and develop a strong and competitive economy (URT, 2000). With this vision, Tanzania of 2025 should be a nation imbued with five attributes; i) high quality livelihoods, ii) peace, stability and unity, iii) good governance, iv) a well educated and learning society; and v) a competitive economy capable for producing sustainable growth and shared benefits. By 2025 it is envisioned that Tanzanians will have graduated from a least developed country to a middle income country with a high level of human development (URT, 2000). The vision recognizes the important of water resources in the attainment of the vision (URT, 2000). Water is regarded as a main ingredient in poverty reduction through ensuring food security, self-sufficiency and household domestic uses among other things (URT, 2000). Water will together with other resources form the nexus for the attainment of this vision. However efforts will be directed towards ensuring the adequate provision and supply of water resources on an equal and equitable basis (URT, 2000). This presents challenges for government and other stakeholders regarding the planning, management and conservation of water resources.

2.12 The National Strategy for Growth and Reduction of Poverty (NSGRP)

The National Strategy for Growth and Reduction of Poverty (NSGRP) by its Kiswahili acronym is known MKUKUTA is a national framework for putting the focus on poverty reduction high on the Tanzania's development (URT, 2005a). The NSGRP cluster II Goal 3 stipulated a target to increase proportion of rural population with access to clean and safe

water from 53% in 2003 to 65% in 2009/ 10 within 30 minutes of time spent on collection of water (URT, 2005a). For urban households accessibility to clean and safe water expected to increase from 73% in 2003 to 90% in 2009/10 (URT, 2005a). The strategy aims to; i) increase sustainable access to inexpensive and reliable sources of water in rural and urban areas, ii) apply life line tariffs that ensures affordability of access to safe water, especially in rural areas and focusing on vulnerable households, including older people headed by household, iv) implementation of water policy and water related regulation frameworks (URT, 2005a).

The government continued to implement the National Water Sector Development Strategy (NWSDS) and Water Sector Development Program (WSDP) which guide the implementation of various water supply and sanitation service delivery projects and water resource management interventions (URT, 2006a). As a result, there has been a significant progress in this area over the last two years. Supply of clean and safe water in rural areas has increased from 53.5 percent in 2005/6 to 55.7 percent in 2006/7; a two percent increases as targeted in MKUKUTA (URT, 2008). The population with access to clean and safe water in urban areas increased from 74 percent in 2005/6 to 78 percent in 2006/7 (URT, 2008).

2.13 The Tanzania National Water Policy (NAWAPO)

For rural water supply, the Tanzania National Water Policy of 2002 has an overall objective to improve health and alleviate poverty of the rural population through improved access to adequate and safe water (URT, 2002a). The policy target is; the basic level of service for domestic water supply in rural areas shall be a protected, year-round supply of 25 litres of potable water per capita per day through water points located within 400

metres from the furthest homestead and serving 250 persons per outlet (URT, 2002a). High service levels including house connections will be encouraged where it is technically feasible and there is an effective demand. In order to enhance availability of water particularly in arid and semi-arid rainwater harvesting will be promoted in rural areas. Therefore communities should be made aware and encouraged to use rainwater harvesting technologies and storage techniques (URT, 2002a).

The Tanzanian Water Policy of 2002 is the leading tool for activities in different levels of water resources management. The policy emphasizes the prioritization of water uses, hence ensuring the social and economic activities as well as environmental services so as to increase sectoral productivity and mitigate poverty. Recognizing that water is a basic human necessity, the policy gives priority to adequate quantity and acceptable quality for all (URT, 2002a). Therefore, for water availability and sustainability, gender mainstreaming need to be considered because is a way to ensure adequate representation of men and women in planning, operation, maintenance and management of water programmes and projects.

Generally inadequate attention to water supply systems maintenance is among of the major possible causes for the variation of statistics showing the accessibility of households to improved water sources from one year to another. Other causes include different types of indicators used in different policies and strategies on measuring households' accessibility to improved water sources, missing of information in some years as well as use of old data such as Census data of 2002. Some of those indicators used on measuring households' accessibility to sustainable improved water sources include; distance from

home to water sources, proportion of population access to water sources and types of water sources used by households. Details are shown in appendix 5.

2.14 Conceptual Framework for the Research

Independent and dependent variables have a direct relationship to each other. For instance the more the time individuals spent on domestic water collection, the less the time spent on economic productive activities which in turn results to low productivity and consequently lead to poverty among rural households.

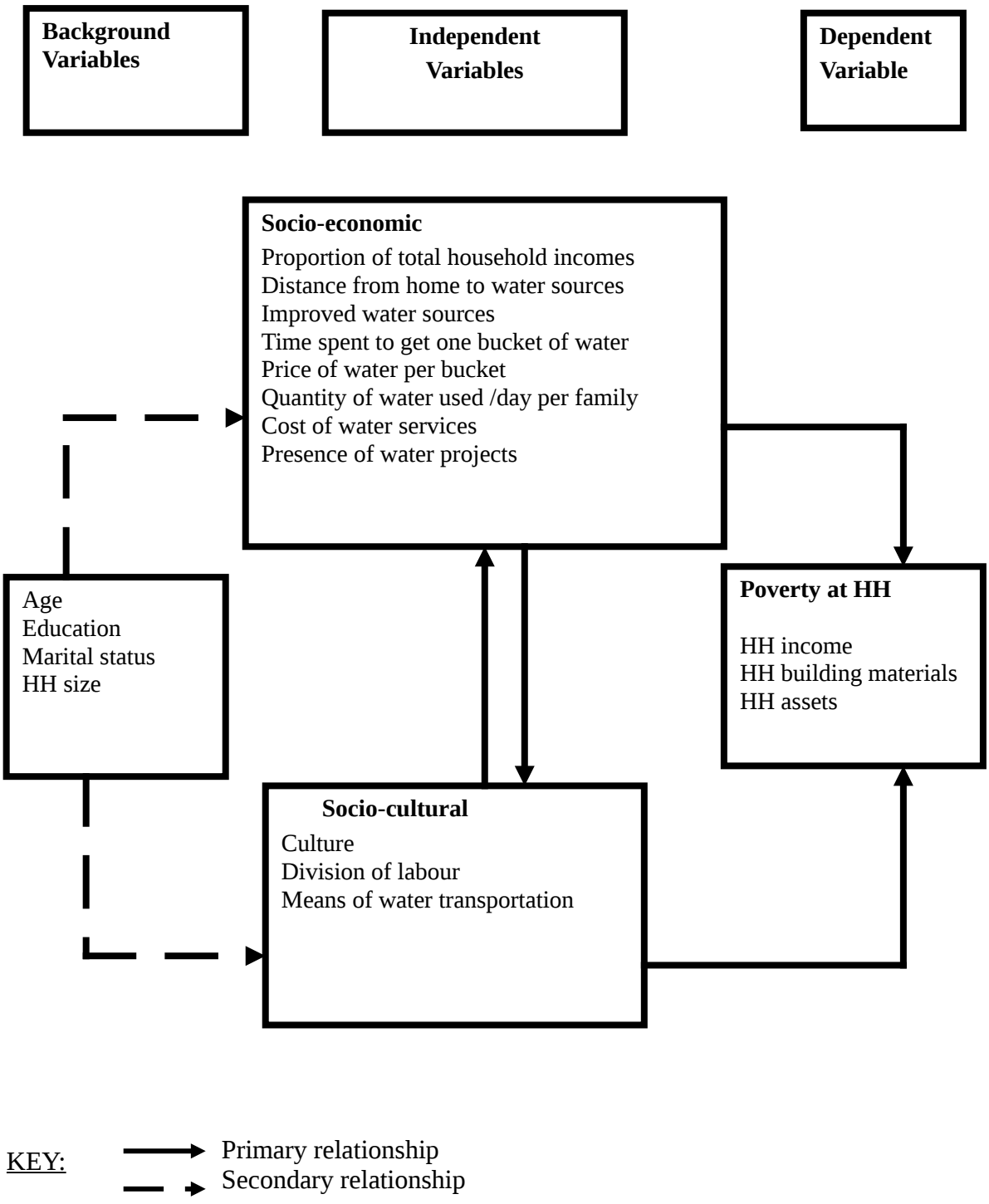

Figure 1: Conceptual Framework for the Research

Table 2: Operation definition of key variables

Variables	Operational Definition
Poverty	• Household income earned per year • Types of assets owned by households • Types of household building materials
Income	Amount of cash money earned by household per month
Age	Number of years of birth
Sex	Biological differences between male and female
Culture	Traditions, used on fetching water among men and women
Education level	Number of years of schooling
Household income generating activities(IGAs)	Productive activities undertaken by household members i.e. agriculture, tailoring
Family size	Number of people per household
Marital status	Being single, married, divorced, separated, widower, widow
Domestic water	Water for daily household activities i.e. cooking, drinking etc
Water rich households	Households within 400 metres to water sources
Water scarce households	Households beyond 400 metres to water sources
Improved water sources	Availability of piped or protected water sources
Distant water sources	Length in Metres (M) from household to water sources
Time spend to collect water	Minutes used to get water from water sources to home
Quantity of water used	Amount of water in litres used per household per day
Price of water per bucket	Amount of money paid per bucket (20lts) of water.
Means of water transportation	Ways of carrying water from sources to households
Water supply support	Presence of donor funded water projects

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Study location and justification

The research was conducted at Kilolo District in Iringa Region. Kilolo District is one of the seven districts in the region. Other districts are Mufindi, Njombe, Makete, Ludewa, Iringa Urban and Iringa Rural. The geographical coordinates of Kilolo District are 8° 0' 0" South, 35º 51' 0" East. Kilolo District is bordered to the North and East by the Morogoro Region, to the West by the Iringa Rural District and to the South by the Mufindi District.

The district is divided into three divisions namely; Mazombe, Mahenge and Kilolo. There are 12 wards and 83 villages within the district. According to the 2002 Tanzania National Census, the population of Kilolo District was 204,372 people of whom 104,372 and 99,756 were females and males respectively (NBS, 2002). The district has been chosen because it is among the most deprived districts in Iringa region in terms of water scarcity (URT, 2005b). Only 48% of rural households are using improved water sources (piped and protected). In terms of poverty, about 29% of the population in the district is below the poverty line and the number of poor people per Kilometre Square is 7 (URT, 2005b).

3.2 Research design

The research used a cross-sectional design in which data from respondents was collected at a single point of time. The design has been recommended by Bernard (1994) and Babbie (1990) because of its dual characteristics. Data collected used for the purposes of simple statistical description, interpretation and also makes it possible to determine the

relationship between different variables that were in focus at the time of the survey. The method is also suitable where time and resources are limited (Bailey, 1998).

3.3 Sampling Procedure and Sample size

The sample was drawn from households within 400metres and those households beyond 400metres to water sources in Kilolo District. The sample was drawn from two wards, where 60 respondents were drawn from each ward making a sample size of 120 selected on which 34, 26, 29 and 31 respondents drawn from Kilolo, Lulanzi, Vitono and Kipaduka respectively.

Purposive sampling and simple random sampling (SRS) methods were employed to get the sample size required. The purposive sampling method was used on selecting two wards and two villages in Kilolo District of the two wards. Two wards, one water rich (respondents located within 400 metres to water sources) and the other water scarce (respondents situated beyond 400 metres to water sources) were selected for the study and within those two wards; two villages were selected from each ward. With the assistance of the District Water Engineer office four villages namely; Kilolo and Lulanzi in Mtitu ward, Vitono and Kipaduka in Uhambingeto ward were selected for the study. Finally simple random sampling method was employed on selecting 60 respondents from Kilolo and Lulanzi villages as well as 60 respondents from Vitono and Kipaduka villages.

3.4 Data collection methods

3.4.1 Primary data

Interview schedule and Checklists were used for data collection in this study. An interview schedule was used for household respondents where open and closed ended questions

were conducted. On the other hand checklist was employed for discussion with three officers from District Water Engineer. Data collection was conducted between November and December, 2007.

3.4.2 Secondary data

Secondary information related to effect of domestic water supply on poverty were obtained from various sources .The sources include higher learning institution libraries such as Sokoine National Agricultural Library (SNAL), University of Dar es Salaam Library, Kilolo District Water Engineer, Internets and other relevant sources.

3.5 Data analysis

Data collected from respondents was cleaned, coded and analyzed using the Statistical Package for Social Sciences (SPSS) version 12.0 computer software to find out distributions of individuals variables (Univariate analysis). Descriptive statistics including means, frequencies and percentages were computed to determine distribution of individuals' variances among the respondents. The relations between some pairs of variables were determined through bivariate analysis including Cross-tabulation and T-test. A T-test was employed to compare and find whether there were differences in means of some variables such as household incomes. Therefore, the hypothesis of difference in household incomes was tested using T-test.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 General overview

This chapter presents the results and discussion of the research findings. The chapter is divided into the following sections: households' characteristics, households' accessibility to domestic water supply, comparison between household water supply and poverty status as well as causes, effects and measures of insufficient domestic water supply at household level.

4.2 Households characteristics

4.2.1 Demographic variables

The demographic variables involved in this research included; village, sex, age, marital status, household size, education level and main occupation of respondents. These demographic variables are summarized in Table 3 & 4.

Table 3: Demographic Variables (N = 120)

Variable	Sex of respondents					
	Male	**%**	**Female**	**%**	**Total**	**%**
Age						
19-40	41	34.2	46	38.3	87	72.5
41-60	17	14.2	8	6.7	25	20.8
61-80	6	5.0	2	1.7	8	6.7
Total	64	53.3	56	46.7	120	100
Marital status						
Married	62	51.7	46	38.3	108	90.0
Widow	0	0	10	8.3	10	8.3
Widower	2	1.7	0	0	2	1.7
Total	64	53.3	56	46.7	120	100
Main occupation						
Farmer	61	50.8	54	45.0	115	95.8
Employee	3	2.5	2	1.7	5	4.2
Total	64	53.3	56	46.7	120	100
Education level						
None	2	1.7	4	3.3	6	5.0
Below standard 7	10	8.3	5	4.2	15	12.5
Completed standard 7	44	36.7	44	36.7	88	73.3
Ordinary level	5	4.2	2	1.7	7	5.8
Tertiary	3	2.5	1	0.8	4	3.3
Total	64	53.3	56	46.7	120	100

4.2.2 Age of respondents

The target group of the study involved either a husband or a wife regardless whether he/she was a head of household. The findings indicated that the age of respondents ranged between 20 and 76 years old. The age of respondents was categorized into three groups; youth age group ranged 19-40 years, middle age group 41-60 and 61-80 years as elderly group. About seventy two percent of the respondents (Table 3) were between the ages of 19 and 40 years. From these findings, it is observed that, the majority of respondents in the research area were the most active manpower because they fall in the youth age group (19-40).

4.2.3 Marital status of respondents

The results of this research as indicated in Table 3 show that, out of 120 respondents, 108 were married, 10 widows and 2 widowers. The findings are equivalent to 90%, 8.3%and 1.7% for married, widow and widowers respectively. The fact that 90% of respondents are married is an indication that households in the study area have a great opportunity of reducing workload through sharing between men and women. In turn, both women and men will have enough time to invest in other income generating activities and hence increase household incomes. However, the research observed that women performed most of household activities and had heavy work load compared to men in the study area. According to FAO (1996), the imbalance of division of labour between men and women seems to reduce productivity particularly in areas where women as the major producers are burdened with both productive and reproductive activities.

4.2.4 Household size

The household size was categorized into three groups; 1-5, 6-10 and 11-15. About 53.3% of households had household sizes of a range between 1 and 5 household members (Table 4). The minimum and maximum number of people observed per household was 1 and 14 respectively. This resulted to an average household size of 5.7. This average of household size is greater than that of Iringa Region which is 3.9 and 4.5 of Kilolo District (URT, 2003).

Table 4: Household size

Range	Number of Respondents	Percent
1-5	64.0	53
6-10	49.0	41
11-15	7.0	6
Total	120.0	100

Household size mean, minimum and maximum

Mean	5.7
Minimum	1.0
Maximum	14.0

4.2.5 Education level of respondents

The findings of this research as in Table 3 show that, most of respondents have completed standard seven education level. Out of 120, 5% had no formal education, 12.5% attained education but did not attain to standard seven, 73.3% completed standard seven, 5.8% ordinary level education and 3.3% attained tertiary education level. This implies that, most of households in the study area have enough formal education (primary education) to fight against poverty and other enemies like diseases.

4.2.6 Main occupation of respondents

Analysis of respondents' main occupation as in Table 3 show that 95.8 % were engaged in agricultural activities and 4.2% were employed in formal sectors. The agricultural activities included; crop production, livestock production and gardening. Water was identified as crucial to development of both farmers and non farmers in the study area. Water was used for domestic purposes (drinking, cooking, washing and bathing) and rarely on productive activities (gardening, brewing local beer and livestock watering).

4.3 Households accessibility to domestic water supply

4.3.1 Sources of domestic water supply

In this study respondents were requested to mention the major sources of water for domestic purposes including drinking and other household purposes. The main identified water sources included; tap water, protected shallow wells, unprotected shallow wells and rivers. In Mtitu ward, about 56.7%, 28.3%, and 15% of respondents used tap water,

protected shallow wells and unprotected wells respectively as source of water for drinking purposes (Table 5). Whereas in Uhambingeto ward there were no tap water, but 31.7% and 68.3 % of respondents used protected and unprotected water sources respectively for drinking purposes.

Table 5: Domestic water sources for drinking and other household uses

	Water rich Villages (N = 60)				**Water scarce Villages (N = 60)**			
Drinking water	**Kilolo**	**Lulanzi**	**Total**	**%**	**Vitono**	**Kipaduka**	**Total**	**%**
Tap water	34	0	34	56.7	0	0	0	0
Protected shallow wells	0	17	17	28.3	5	14	19	31.7
Unprotected shallow wells	0	9	9	15.0	24	17	41	68.3
Total	34	26	60	100	29	31	60	100
Water for other household uses								
Tap water	29	0	29	43.3	0	0	0	0
Protected shallow wells	0	15	15	25.0	4	4	8	13.3
Unprotected shallow wells	0	11	11	18.3	25	27	52	86.7
Rivers	5	0	5	8.3	0	0	0	0
Total	34	26	60	100	29	31	60	100

Furthermore, the study assessed the types of water sources used for other domestic purposes. Other domestic water uses reported by respondents were cooking, washing clothes, bathing, washing utensils, gardening, watering livestock, brewing local beer and for building purposes. According to this study, 8.3% used rivers, 25% used protected shallow wells, 43.3% tap water and 18.3% used unprotected shallow wells water for domestic normal household chores in Mtitu ward. For Uhambingeto ward, the findings show that, 13.3% used protected shallow wells and 86.7% used unprotected shallow wells as their major source of water for other household domestic purposes.

The study findings implies that, respondents at Kipaduka and Vitono villages in Uhambingeto ward relied much on protected water sources (31.7%) and unprotected water sources (68.3%) for drinking and other domestic purposes. In Kilolo and Lulanzi villages (Mtitu ward), respondents relied much on tap water (56.7%) and protected shallow wells (28.3%) for drinking and other domestic purposes. From these findings, Vitono and Kipaduka villages can be classified as water scarce villages while Kilolo and Lulanzi villages can be classified as water rich villages.

Availability of water in Mtitu ward has been funded by the Anglican Church. The church has funded provision of tap water supply services at only four villages in Mtitu ward within the district, those villages were Kilolo, Lusimba, Luganga and Lutungule. The project (Anglican Church) not operated in Lulanzi village. The tap water supplied services were distributed at sub- village levels in those villages. Kilolo village had three sub-villages on which all sub- villages were supplied with one tap water (tap water centre). The situation contributed the increase of household income in Kilolo village (section 4.9.2.1) and the decrease of outbreak of water borne diseases such as diarrhea. Similar findings were reported by Sousan (2002) who noted that availability of safe drinking water combined with the use of proper storage facilities could prevent much of the diarrhoea diseases, morbidity and mortality in developing countries.

4.3.2 Households accessibility to domestic water sources

According to the Global Water Supply and Sanitation Assessment 2000 Report by WHO / UNICEF, the terms ‘access to improved water supply and sanitation’ is defined based on the types of technology and levels of service afforded (WHO and UNICEF, 2000). For water, “Reasonable access” has been broadly defined as the availability of at

least 20 litres per person per day from a source within one kilometre of the user's dwelling (WHO and UNICEF, 2000). Everyone has access to water in some form. Accessibility to water sources from dwellings can be primarily measured by distance and time spent on collecting water (WHO and UNICEF, 2000).

In this study respondents were requested to mention the types and accessibility of water sources for household domestic purposes. Accessibility to water sources in this study was measured by mean distance respondents walked for water from their dwellings. Accessibility to water sources was variable between the villages. Table 6 show that in Mtitu ward respondents walked an average of 309 and 77.3 metres to water sources in dry and rain season respectively whereas in Uhambingeto ward, people walked an average of 3188 and 874.3 metres to water sources from homesteads during dry and rain season respectively.

Table 6: Mean distance (metres) to access domestic water sources

Wards	Dry season	Rain season	Total
Mtitu (water rich)	309.0	77.3	386.6
Uhambingeto(water scarce)	3 188.0	797.0	3 985.0
Total	3 497.0	874.3	4 371.6

The findings implies that water rich villages, Kilolo and Lulanzi in Mtitu ward had relatively better access to domestic water supply compared to water scarce villages, Vitono and Kipaduka in Uhambingeto ward. Easy accessibility of domestic water supply in Kilolo and Lulanzi villages was contributed by availability of natural spring water (Chemchem za asili and Mfwilo in Swahili and Hehe language respectively) source in Lulanzi village and the presence of river Mtanguka which saved both villages. The river Mtanguka is within a distance of 500 metres from dwellings of both villages.

Furthermore, particularly in Kilolo village the Anglican Church institution has supported the village tap water system within a short distance to the majority of the village residents (Section 4.3). This increased the accessibility to water sources for domestic purposes through out the year. In Lulanzi village, there was no tap water but residents accessed water from protected shallow wells and river Mtanguka in both dry and rain seasons with limited problems.

However in Vitono and Kipaduka (water scarce) Villages, accessibility to domestic water sources was reported by respondents interviewed as a serious problem because both villages reported to have no reliable water sources for their respective residents. Thus, the

individuals accessed domestic water from neighbouring villages in most cases particularly in dry season (Section 4.3).

4.3.3 Reliability of domestic water sources

The meaning of reliability in the context of water sources has been changing through the time; initially meeting water demand was the determinant concern (IRC, 2004). Later on quantity and quality issues of water for both domestic and productive purposes became more important (Lewis, 1994). In this study, reliability of domestic water was defined as the availability of water from the respective water sources through out the year.

Respondents and key informants were asked to give explanation on the reliability of domestic water sources in their respective areas. Respondents from Kilolo and Lulanzi villages reported that, domestic water sources were reliable for both periods dry and rain seasons. This was probably due to availability of natural spring water intake sources in Lulanzi village which served both villages and the presence of river Mtanguka which also served both villages. In very rare cases however, this reliable water source is interrupted and respondents indicated that they access water from neighbouring villages (i.e. Luganga) which located within a distance ranged from 0.5 to 2 km.

The situation was contrary to Vitono and Kipaduka villages where the water sources were not reliable. In Vitono village the available water source (shallow wells) reported was seasonal and too saline which was not good for human consumption such as drinking. The source was seasonal, served for short period of the year only for 4 months (January to April). In Kipaduka village, the availability of water sources (shallow wells) reported was also seasonal which saved only 6 (January to June) months of the year. Due to unreliability

of domestic water supply, individuals were forced to search water from the neighbouring villages including Image (Number 7) and Uhominyi villages in Image ward. These villages have natural springs water, and imported water tape systems connected to the natural springs that provide relatively more reliable domestic water.

The average distance from Vitono and Kipaduka Villages to neighbouring villages (Number seven, Uhominyi, Ilula and Mawala) with reliable water sources ranged between 8 and 12 km.

4.3.4 Ownership of domestic water sources

Worldwide, most of natural resources are owned by the public and water is among of natural resources (URT, 2002a). In this study respondents were asked to explain the ownership of water sources. All water sources (tap water, rivers, protected and unprotected shallow wells) in the study area were owned by the respective communities where the sources were located. In Kilolo village, the three tap water centres which have been established by the Anglican Church Institution at each sub- village, each centre was owned by the respective community of that sub-village. In Lulanzi and Kipaduka villages, the presence protected shallow wells pumping systems which have been constructed by the Kilolo District Council (KDC) and DANIDA project respectively were owned by the community of the respective village where the water source was situated. In Vitono village there was a water pump machine which had been constructed by the DANIDA project and its operation depended on the availability of ground water sources. The system was not functioning particularly in dry season due to inadequate ground water sources in the village but however the system reported useful during rain season where ground water source becomes adequate.

For sustainability of those water sources, communities in the study area were tasked to pay full operation and maintenance (O&M) costs and costs of all higher service levels as well as to manage their water sources. The contribution of O &M costs were supervised by each village government under the village water development committees. Due to water problems in some villages within the study area, villages with water shortage were allowed to collect water from water rich villages with the condition of sharing the O&M costs of that particular water sources. The proportion of contribution of O&M costs varied from one village to another and between the community within water sources and that community situated outside water sources. The study identified that on O&M costs, the community from outside the water sources contributed higher costs than the community located within the water source.

In Kilolo village each household from outside the village contributed 100 Tshs (Tanzanian shilling) per month while each household within the village contributed only 50Tshs per month as O&M costs. In Lulanzi village no people from outside the village reported to fetch water in Lulanzi village, but however each household in the village contributed 150Tshs per month for domestic water O&M costs.

In Vitono village, people collected water for domestic purposes from Ilula and Mawala village which is about 6 to 12kilometres respectively from Vitono village and each household was charged with an average of 500 and 700 Tshs per month during rain and dry season respectively. Whereas each household in Mawala village was charged 150 Tshs per month as domestic water O&M costs. People from kipaduka village particularly in dry season they usually fetched water from Image and Uhominyi villages which is about 5 to 8 kilometres from Kipaduka. Those water services from each village (Image and Uhominyi)

were charged per month per household with an average of 300 and 500 Tshs during rain and dry season respectively. Each household from Image and Uhominyi village was charged 100 and 50 Tshs respectively per month for domestic water O&M costs.

The system of water sources ownership in the study was found in line with the Tanzania National Water Policy. The policy stipulated that all water in the country is vested in the United Republic of Tanzania and every citizen has an equal right to access and use the nation's natural water resources for his/her and the nation benefit (URT, 2002a).

4.3.5 Division of labour at household

The roles that women and men play are different in any given society and their situation are determined by legislation ,religion norms, economic status or class, cultural values ,ethnicity and types of productive activities of their countries, communities and households (Brett,1991). Women are usually responsible for domestic activities such as they care children, family health, collecting water and firewood, cooking and providing food and household services (Koda, 1990). In most societies women play a major role in productive activities of the family, in farming, unpaid domestic work and other income generating activities (Touwen, 1996). The majority of women particularly in the developing countries are economically marginalized, poor and their work pattern have common features (Touwen, 1996).

4.3.6 Responsibility of fetching water

4.3.6.1 Responsibility of fetching water in dry season

Respondents were asked to mention who is responsible for fetching water among the household members. This was conducted to both water rich and water scarce areas.In

water rich areas none of the interviewed respondents reported that male as the major responsible of fetching water during dry season, while 47% of interviewed respondents indicated women alone responsible of fetching water for household domestic purposes. Thirty two percent and 21% of respondents indicated that both (women and men) as well as boys and girls respectively were responsible for fetching water for household domestic uses(Table 7).

In water scarce areas the study findings indicated that 57% of interviewed respondents indicated both (females and males) were responsible of collecting water for their household requirements in dry season.

Table 7: Responsibility for fetching water at household

Responsible	Water rich (N = 60)		%	Water scarce(N = 60)		%
	Kilolo	Lulanzi		Vitono	Kipaduka	
In dry season						
Male only	0	0	0	0	3	5
Female only	15	13	47	5	5	17
Male &female	10	9	32	19	15	57
Boys & girls	9	4	21	5	8	21
Total	34	26	100	29	31	100
In rain season						
Male only	0	0	0	0	3	5
Female only	23	17	67	11	15	43
Male & female	1	0	2	12	4	27
Female & girls	0	0	0	4	1	8
Boys & girls	10	9	31	2	8	17
Total	34	26	100	29	31	100

4.3.6.2 Responsibility of fetching water in rain season

Results of this study show that 67% of respondents indicated females only were reported responsible of collecting water for their respective household uses whereas no males only indicated responsible of fetching water activities during rain season. Only 2% indicated that both (females and males) were responsible of collecting water for their families' domestic purposes in water rich areas (Table 7). In water scarce areas during rain season,

the study findings indicated that 27% of both (females and males) were responsible of collecting water for domestic purposes.

The study finding implies that, in both seasons, dry and rain; women were reported the major responsible group for fetching water for their respective families. The rate of males' participation on fetching water was higher in dry season as compared to rain season. Thirty two percent and 57% of respondents indicated both males and females were responsible for collecting water in dry season in water rich and water scarce respectively and during rain season only 2% and 27% of respondents indicated both female and males were responsible. This is probably due to the fact that in dry season domestic water services obtained from long distance to dwellings (section 4.4).

The long distance to water sources from dwellings needed some means of water transportation such as bicycles on which males were reported experienced compared to females in most cases within the study area. However in Kilolo and Lulanzi villages where domestic water services obtained within short distance, still women subjected with the responsibility of hauling water (Table 7). This was reported as culturally and traditionally inherited behaviours on which women were tasked with most of domestic activities including collecting water and firewood, cooking and child caring.

On both cases, dry and rain season 3(5%) of males only was reported responsible for fetching water in the study and all of them were identified in Kipaduka village. The situation was associated with prolonged health problems of their respective partners which prohibited them from walking long distance and carrying heavy lagged.

Based on this study, males were found more helpful to females when females were sick and in dry season as compared to rain season in household chores particularly on fetching water. The study findings related with other many studies, for example studies in Africa have estimated that a typical woman spends from 1 to 4 hours per day on transporting water for her family uses (Barret *et al*. 2005). Therefore reducing the time spend on water collection may mean that more time becomes available for other productive and household tasks.

4.3.7 Time spent by sex for fetching water

Table 8 show that in water rich villages, women and men spent an average of 150 and 25 minutes respectively per day in dry season for fetching water. In rain season women and men spent average of 65 and 5 minutes for collecting water for domestic purposes. Women and men in water scarce villages spent an average of 508 and 375 minutes in dry season respectively of collecting water. In rain season women and men spent an average time of 167 and 64 minutes on collecting water for their respective households.

Table 8: Average time (minutes) spent by sex for fetching water

Ward	In dry season			In rain season		
Water rich	**Women**	**Men**	**Total**	**Women**	**Men**	**Total**
Kilolo	49	14	63	25	3	28
Lulanzi	101	11	112	43	2	45
Sub-total	150	25	175	68	5	73
Water scarce						
Vitono	245	194	439	90	40	130
Kipaduka	263	181	444	77	24	101
Sub -total	508	375	883	167	64	231
Total	658	400	1058	235	69	304

The above findings implies that in both wards, Mtitu and Uhambingeto, women spent relatively much time for fetching water for household purposes as compared to time men spent. Results in Table 8a indicate that women and men in Uhambingeto ward spent more time on fetching water per day as compared to women and men from Mtitu. This was probably contributed by long distance from home to water sources experienced by the households in Uhambingeto which was ranged between 4 to 12 kilometres. Means of water transportation was also reported as among of the causes for women to spend much time on fetching water. Men used bicycles for water transportation while on head/on foot was the major means of water transportation employed by women (section 4.8.1).

Statistical T- test analysis was applied to compare the difference in mean of time spent between water rich and water scarce areas. The findings of T-test show a highly significant different in time spent of collecting water for domestic purposes between water rich and water scarce villages ($P < 0.05$) in both dry and rain season (Table 9).

Table 9: Mean time spent of fetching water in water rich and water scarce villages

In dry season	Respondents	Mean time	T - Test	P- Value
Water rich	60	101.25	- 14.76	0.000

Water scarce	60	434.50		
In rain season				
Water rich	60	41.42	- 8.16	0.000
Water scarce	60	110.68		

During dry season a mean of 101 and 435 minutes used by individuals on fetching water per day for domestic purposes in water rich and water scarce villages respectively. In water rich and water scarce villages a mean of 41 and 111 minutes respectively used for fetching water per day during rain season (Table 9). This implies that respondents spent more time of fetching water in dry season compared to time spent during rain season. That time spent on water activities could be worth located to economic activities.

4.3.8 Income generating activities (IGAs)

According to Ellis (2000) income refers to output of activities it measures both cash and in-kind contributions. All the goods and services produced in activities are valued at market producer prices regardless of their use. So, all own-farm products are valued at the same price as if they were sold. Income generating activities comprise both farm and non-farm (Touwen, 1996). Examples of IGAs include crop and livestock production, business, food and beer making, hunting, cottage industries and tailoring.

4.3.8.1 Major IGAs related to water

The major IGAs related to water in the study area were livestock production, crop production, food vendors, local beer brewing and gardening (Table 10). Fourty two percent of respondents identified livestock production as major water related IGA and 39% reported crop production as the major water related IGA. Livestock production was

much related IGA to water than crop production because, livestock production was reported to be undertaken in both dry and rain seasons, thus water demand for those livestock became high. On the other hand crop production was mostly practiced in rain season in which water demand became minimal due to dependent on rain fed cropping system. Other IGAs related to water were local beer brewing (6.1%), food vendors (3.8%) and gardening (8.8%).

Gardening was mainly practiced in water rich villages such as in Kilolo because the activity is water oriented. However, gardening is a short period cropping system which can be undertaken even more than four times per year on the same plot depending on the types of crops. Proper gardening contributed to incomes and improving nutrition status at households.

Table 10: Major IGAs related to water (N = 120)

	Responses					
Type of IGA	**Kilolo**	**Lulanzi**	**Vitono**	**Kipaduka**	**Total**	**Percent**
Livestock production	12	18	27	23	90	42
Crop production	19	23	21	20	83	39
Local brew	2	2	7	2	13	6
Food vendors	2	4	0	2	8	4
Gardening	12	3	3	1	19	9
Total	47	50	58	48	213	100

NB: Total frequency do not add to 120 due multiple response

Therefore, the study observed that adequate supply of domestic water can create an opportunity to households on using that water in other activities which in turn increases their incomes and consequently reduce poverty.

4.3.8.2 Time spent by sex for IGAs

Respondents were requested to give the average time spent per day on income generating activities (IGAs). Estimation of average time spent by sex for IGAs was done through asking respondents the time spent per day on household domestic activities and time spent on IGAs. Table 11 indicates the distribution of time spent by men and women on IGAs. In Kilolo and Lulanzi villages women and men spent an average of 411 and 409 minutes respectively per day for IGAs; whereas in Vitono and Kipaduka village women and men spent an average of 293 and 291 minutes respectively for IGAs.

Table 11: Average time (minutes) spent by sex for IGAs per day

	Time spent by sex		
Village	**Women**	**Men**	**Total**
Kilolo	389	380	769
Lulanzi	433	437	870
Mean	411	409	820
Vitono	289	284	573
Kipaduka	296	298	594
Mean	293	291	584

Statistical T- test analysis was applied to compare the difference in mean time spent by women and men for IGAs in both water rich and water scarce areas (Table 12). The findings of T-test show a highly significant different between mean time spent by women and men for IGAs in the study area ($P < 0.05$). Women from both water rich and water scarce areas spent an average of 408 and 302 minutes for IGAs respectively. Men reported spent an average of 412 and 296 minutes in water rich and water scarce areas respectively for performing IGAs.

Table 12: Comparison of mean time (minutes) spent by sex for IGAs

Variable	Mean	T- test	P- value
Women			
Water rich	408	5.93	0.000
Water scarce	302		
Men			
Water rich	412	6.16	0.000
Water scarce	296		

These results implies that in both water rich and water scarce villages women spent more time on IGAs compared to time spent by men. The study findings agrees with a study done in Ghana which found that rural men spent one third of the time and one quarter of the energy that rural women spent per day (Barwell, 1996).

4.3.9 Distance to water sources

In this study, respondents were requested to give the time used for fetching water per trip (go and return).That time used was converted to distance by equating 30 minutes equivalent to 400 metres which based on the Tanzania National Water Policy (2002 a) guidelines. The findings from the study indicated 6400 and 2184 metres as the minimum, maximum and mean distance on which individuals walked from home to water sources (Table 13).

Table 13: Minimum, maximum and mean distance to domestic water sources

Range	Distance in metres
Minimum	40
Maximum	6400
Mean	2184

According to URT, (2002a), clean and safe water is required to be located within 400 metres from household to water sources on which an individual can spend an average of 30 minutes per trip (on going, collecting and returning). However the situation was found

contrary different from this study findings where by 75 (62.5%) of respondents were situated beyond 400 metres to water sources from their homes. About 45 (37.5%) of the respondents interviewed were within 400 metres to water sources from their dwellings (Table 14). The individuals located within 400 metres to water sources were identified in Kilolo and Lulanzi villages and none identified in Vitono and Kipaduka villages.

Table 14: Distance (M) from home to water sources (N = 120)

	Villages					
Distance	**Kilolo**	**Lulanzi**	**Vitono**	**Kipaduka**	**Respondents**	**%**
≤ 400	33	12	0	0	45	37.5
401 -1200	1	12	0	0	13	10.8
1201-2000	0	2	0	0	2	1.7
2001-2800	0	0	3	1	4	3.3
2801-3600	0	0	6	16	22	18.3
3601-4400	0	0	7	9	16	13.3
4401-5200	0	0	5	3	8	6.7
Above 5200	0	0	8	2	10	8.3
Total	34	26	29	31	120	100

Furthermore, statistical T- test analysis was applied to compare the mean distance of respondents from water rich and water scare villages. The findings of T-test as in Table 15, revealed a highly significant different of distance between water rich (Mtitu) and water scarce (Uhambingeto) respondents ($P < 0.05$). Individuals in Mtitu and Uhambingeto wards walked an average distance of 355 and 4013 metres respectively from home to water sources.

Table 15: Mean distance from home to water sources in Mtitu and Uhambingeto

Wards	**Respondents**	**Mean**	**T-test**	**P-value**
Mtitu (water rich)	60	355	-26.039	0.000
Uhambingeto (water scarce)	60	4013		

The findings of this study concurs with a study by Malmberg-Calvo (1996) which noted that individuals particularly women and children in most area of Africa spent much of their time on fetching water and some walk as much as six kilometers (6km) per day. That time could be better spent on education, growing food, running a business or leisure time with their families or friends. Therefore reliable and sufficient supply of domestic water within a short distance combined with proper uses of water and time gains can be mostly economic important for the poorest.

4.3.10 Means of domestic water transport

In this study respondents were asked to mention the major means of domestic water transport. The identified major means of domestic water transport were; on heads /on foot, by bicycles and animals (Table 16). Table16 show that two percent and 79% of interviewed males and females respectively indicated carrying water on their heads from water sources to homes. Also the study identified that 88% and 10% of males and females respectively used bicycles for transporting water from sources to their homes. About 10% and 11% of males and females respectively reported to using animals for domestic water transportation from sources to their dwellings.

Table 16: Means of domestic water transport from sources to households (N = 120)

	Male and Female											
	Kilolo		**Lulanzi**		**Vitono**		**Kipaduka**		**Total**		**Percent**	
	M	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**	**M**	**W**
On head	0	34	0	26	0	6	2	25	2	91	2	79
By bicycle	33	0	16	0	18	11	25	1	92	12	88	10
Animals	0	0	0	0	9	10	1	3	10	13	10	11
Total	33	34	16	26	27	27	28	29	104	116	100	100
	Boys and Girls											
	B	**G**	**B**	**G**	**B**	**G**	**B**	**G**	**B**	**G**	**B**	**G**
On head	0	30	2	22	1	4	5	18	8	74	7	76
By bicycle	31	0	15	0	14	10	16	3	76	13	82	13
Animals	0	0	0	0	7	8	3	3	10	11	11	11
Total	31	30	17	22	22	22	24	24	94	98	100	100

NB: Frequency do not add to 120 because of multiple response
Where: M = Men B = Boys W = Women G = Girls

Donkeys were the most common animals used in water transportation particularly in water scarce (Vitono and Kipaduka) villages and none or rarely used in water rich (Kilolo and Lulanzi) villages. Those donkeys were kept specifically for transporting various loads by means of carts or on their backs. Individuals in Vitono and Kipaduka villages, they also kept cows for the purpose of utilizing them in cultivation activities and seldom used in transportation maters by driving oxcarts.

In most cases, donkeys were reported to be utilized by women and children for transportation purposes while cows operated by men for cultivation purposes by the means of oxen plough. Financial constraints (economic crisis) faced by households led people in Uhambingeto ward to use those animals (donkeys and cows) interchangeably or in both transportation and cultivation purposes. This was caused by the failure of low income households to own both animals, donkeys for transportation and cows for cultivation.

Long distance from home to water sources particularly in water scarce villages has forced girls and women to engage in riding bicycles for transporting water from sources to their homes. This was contrary to water rich villages where women and girls were solely depended on head as their major means of transporting water from sources to household. Based on these findings, among of the interviewed respondents none of them reported the use of bicycles by woman or a girl for collecting water at Kilolo and Lulanzi villages in Mtitu ward.

The situation was different in Uhambingeto ward where by in Vitono village, 11 women out of 29 respondents interviewed indicated using bicycles for transporting water from sources to households. In Kipaduka village, out of 26 respondents interviewed indicated use of bicycles for fetching water 1 of them was a woman. For girls, respondents interviewed indicated that no girls used bicycles in Kilolo and Lulanzi villages for transporting water. In Vitono and Kipaduka villages, out of 24 and 19 respondents interviewed indicated use of bicycles for transporting water from sources to homes , 10 and 3 of them respectively were girls.

Transporting water by bicycles in long distance led to occurrence of many accidents particularly for women and girls who reported not much experienced on riding bicycles with heavy loads. For example between the year 2005 and 2007, seven cases of serious injuries caused by bicycle accidents during transporting water from sources were reported from Vitono and Kipaduka villages on which five of them were females. Furthermore individuals in water scarce areas invested some part of their incomes on acquiring appropriate domestic water transportation facilities like bicycles, oxcarts, animals and large containers while the situation was not practiced in water rich villages. That part of income could be worth directed to other household productive investment. A similar problem was recognized by the World Bank (1996) found that about 87 percent of travel in rural Africa takes place on foot, and within these households' women is more likely than men to be doing the walking.

4.3.11 Domestic water storage facilities

Table 17 show that 46.8% of respondents used plastic buckets of 20 litres for water storage. Plastic containers of 60 litres as indicated by 15.1% of respondents. Other water

storage facilities include 200 litres barrels as indicated by 27.8% of respondents. Traditional pots made from mud with various sizes ranged from 20 to 60 litres in volume indicated by 10.2% of respondents. Respondents in water scarce villages (Vitono and kipaduka) used large size containers for water storage than water rich villages (Kilolo and Lulanzi).This is because in water scarce villages, individuals walked long distance to water sources thus using large containers water storage like barrels reduces the routine of fetching water for their household uses. During the discussion with key informants, it was observed that most individuals in water scarce villages used the whole day (one day) of fetching water which can be used for household domestic purposes for 3 to 4 days. In this case large water storage containers in water scarce villages become more crucial aspect.

Table 17: Domestic water storage facilities (N =120)

	Responses					
Storage facility	**Kilolo**	**Lulanzi**	**Vitono**	**Kipaduka**	**Total**	**%**
Plastic buckets 20lts	25	22	22	27	96	46.8
Plastic containers 60lts	2	7	14	8	31	15.1
Barrels/drum 200lts	5	7	26	19	57	27.8
Pots	5	11	4	1	21	10.2
Total	37	47	66	55	205	100.0

NB: Frequency do not add to 120 because of multiple response

Respondents from water shortage villages spent relatively much financial resources on acquiring large quantities and durable water storage facilities compared to those villages supplied with adequate domestic water. Most households had reported to have inadequate water storage facilities and get water on daily basis which is economically inefficient, laborious, time and energy consuming. This was probably due to inadequate capital for acquiring appropriate domestic water storage facilities as well as lack of knowledge on harvesting rain water and storage techniques at household level. The financial, energy and time resources used in water storage facilities particularly in water scarce villages could be worth directed to other household productive investments if those villages were supplied with adequate domestic water (FAO, 1996).

4.3.12 Household domestic water utilization

In this study, the respondents were asked to mention the quantity of water in litres used per activity at household level. The total quantity of water in litres reported used per household per day was divided by 6 which is the average household size in this study (Table 4). This helped the researcher to get the average amount of water in litres required per person per day for domestic purposes such as cooking, drinking, bathing, washing

clothes and utensils. Other water uses which were seldom reported by key informants and respondents included gardening and local brew making.

The findings as summarized in Table 18 show that the major priorities of water uses were cooking, drinking, washing clothes, bathing, washing utensils, gardening and brewing local beer. The quantity of water for cooking and drinking purposes was found almost similar in all four villages involved in this study. This is because water for cooking and drinking is the most daily human basic requirement which can not be avoided to both water rich and water scarce individuals.

In water rich villages, an average of 56.6, 47.6 and 18.7 litres of water were reported used per person for washing clothes, bathing and washing utensils respectively. Twenty six percent, 24.4 and 13.8 litres of water used per day in washing clothes, bathing and washing utensils per household member in water scarce villages . Based on that little quantity of water used for washing clothes in water scarce areas, the possible consequences is poor sanitation that include outbreak of water related diseases like skin diseases.

Table 18: Average quantity of water (lts) per household member per day (N = 120)

	Water rich			Water scarce		
Water use	**Kilolo**	**Lulanzi**	**Mean**	**Vitono**	**Kipaduka**	**Mean**
Cooking	29.3	30.9	30.1	28.9	29.8	29.35
Washing clothing	63.0	50.2	56.6	27.6	24.8	26.20
Bathing	50.9	44.2	47.6	27.6	21.1	24.35
Washing utensils	21.7	15.7	18.7	15.6	11.9	13.75
Drinking	6.9	6.4	6.7	6.2	6.9	6.55
Total	171.8	147.4	159.6	105.9	94.5	100.20
Mean	34.36	29.48	31.9	21.2	18.9	20.04

The difference on the amount of water used per day per household member for washing and bathing was probably due to the fact that, respondents in water scarce areas were usually undertaking washing and bathing at water sources which reduced the amount of water carried home . This was observed during the discussion with the key informants.

> *The above findings were further emphasized by an old man who said "based on water problems, washing clothes were rarely undertaken, therefore he usually emphasized each of his family member to put aside at least one clean pair of clothes which can be used in special events such as when some one falling sick and other ceremonial occasions.*

According to WHO (1992) the normal standard water requirement per person per day is 25 litres which is equivalent to 6000 litres per household per month for a household of eight (8) people. In this study, Kilolo and Lulanzi (water rich) villages qualified to meet that standard requirement with an average of 31.9 litres of water per person per day for household domestic purposes (Table 18).

Respondents from Vitono and Kipaduka (water scarce) villages used an average of 20 litres of water for overall domestic water purposes per day per person which was below standard of water requirements (Table 18). This implies that individuals in the study area

excluding in Kilolo and Lulanzi villages were living below minimum water standard requirement. The associated consequences reported by respondents and key informants included, decrease of household incomes because women as major producers spent much time on fetching water rather than performing income generating activities.

4.3.13 Cost of domestic water

Buying water for domestic purposes, the study identified that no respondents were buying water in Kilolo village for both periods, dry and rain season while in Lulanzi, individuals used an average of 173 Tshs per day in dry season and no money used during rain season (Table 19). In Lulanzi village, the interviewed respondents indicated an average range of 50 to 100Tshs as a price charged per one bucket of 20litres of water within the village.

In Vitono and Kipaduka villages an average per day of 1010 and 894 Tshs respectively used for buying water during dry season and an average of 131 and 10 Tshs used in rain season. Respondents interviewed in Vitono and Kipaduka villages, reported the availability of people particularly youth whom dealt with selling water within both villages. The average price per bucket of 20 litres in those villages ranged between 150 and 400 Tshs in dry season and 50 to 200 Tshs rain season.

Table 19: Amount of money (Tshs) used for buying water (N =120)

	Villages					
Category	**Kilolo**	**Lulanzi**	**Total**	**Vitono**	**Kipaduka**	**Total**
In dry season	0	173	173	1 010	894	1 904
In rain season	0	0	0	131	10	141
Total	0	173	173	1 141	904	2 045

This implies that respondents in Vitono and Kipaduka villages used large amount of their incomes on buying water especially in dry season compared to the amount used in Kilolo and Lulanzi villages. This part of earned incomes used for buying water for domestic purposes particularly in dry season could be better invested to other household potential economic development activities.

4.4 Water supply and household poverty status

4.4.1 Poverty indicators

Measuring poverty varies from one place to another depending on the indicators assigned to each category. In this study, household poverty status was measured by using the following indicators: average household income per year, household house building materials, types and values of assets owned by respondents interviewed.

4.4.2 Water sources and income

Respondents were requested to give information on the annual earned income per household. This was conducted to both groups of people; those located within 400 metres to water sources and those located a distance beyond 400 metres to water sources for household domestic purposes. Thereafter cross tabulation analysis was applied for assessing the relationships between distances from residential houses to water sources and annual earned household income.

The annual household earned income (in Tanzanian shilling) was categorized into four groups as follows: ≤ 400 000 Tshs ; 400 100 – 800 000 Tshs; 800 100 – 1 200 000 Tshs and above 1 200 000 Tshs. These groups were categorized based on the minimum and maximum household incomes in the study area as reported by respondents interviewed. The study findings were summarized in Table 20.

4.4.2.1 Annual income of households within 400 metres to water sources

About 38% of households located within a distance of 400 metres to water sources for domestic purposes reported earned an annual income above 1 200 000 Tshs and only 4.4% of households earned an annual income less or equal to 400 000 Tshs (≤ 400 000). Twenty two percent and 35.6% of households earned an annual income between 400 100 – 800 000 and 800 100 – 1 200 000 Tshs respectively (Table 20).

4.4.2.2 Annual income of households beyond 400 metres to water sources

Fourty nine percent of households located beyond 400 metres to water sources reported earned an annual income ranged from 400 100 to 800 000 Tshs while only 21 % of households earned an annual income above 1 200 000 Tshs (Table 20).

Table 20: Relationship between distance to water sources and household income

	Distance(M) from home to water sources					
	Within 400		Beyond 400			
Income (Tshs)	**Households**	**%**	**Households**	**%**	**Total**	**%**
≤ 400 000	2	4.4	10	13.3	12	10.0
400 100- 800 000	10	22.2	37	49.3	47	39.2
800 100- 1 200 000	16	35.6	12	16.0	28	23.3
Above 1 200 000	17	37.8	16	21.3	33	27.5
Total	45	100.0	75	100.0	120	100.0

Statistical T- test analysis was applied to compare the mean annual income between households located within 400 metres to water sources and those households located beyond 400 metres to water sources required for domestic purposes. The findings of T-test analysis showed a significant different of mean annual income between households located within and those beyond 400 metres to domestic water sources at ($P < 0.05$). Households situated within 400 metres to water sources earned a mean annual income of 1 416 367 Tshs and those households beyond 400 metres to water sources earned a mean annual income of 910 307 Tshs (Table 21). The findings led to accepting the null hypothesis stated “Incomes of rural households within 400 metres to water sources differ significantly from those households beyond 400 metres to water sources”

Table 21: Mean annual household income within and beyond 400M to water source

Category	**Respondents**	**Mean (Tshs)**	**T-test**	**P-value**
Within 400M to water	45	1 416 367	3.44	0.035
Beyond 400M to water	75	9 010 307		

The study findings implies that households situated within 400 metres to water sources earned a relatively high income compared to households situated beyond 400 metres to water sources for domestic purposes (Table 21). This is partly because individuals from

households located beyond 400 metres to water sources spent relatively more time on water collection per day than individuals from households located within 400 to water sources (section 4.7.2). The possible explanation for this finding is that the time individuals spent on fetching water reduced the time spent for IGAs and consequently led to low household earned income.

Studies by the World Bank (1992) show that even at national level, countries with adequate water supply for domestic, agriculture and industries purposes earned high income compared to those water scarce countries. Also a study by Nicol (2000), argued that domestic water serves in a wide range of productive uses to secure food and non-food incomes for rural households.

Therefore the study observed that an improved access to water can contribute to local community development. The time, energy and resources saved by improved domestic water supply can be used on productive economic activities which in turn could increase household income and consequently fight against poverty.

4.4.3 Household building materials

Information about household housing condition materials were collected and analyzed based on the three categories; i) extreme poor people their houses characterized by sticks and grasses for walls, and sand/earthen for floors as well as grasses for roofing materials; ii) poor people were categorized as those with houses built from mud only ,unburnt bricks for walls ,sand/earthen on floors and roofing with grasses or iron sheets and iii) non - poor people, their houses built with burnt bricks and cement blocks for walls, cemented floors and roofed with iron sheets.

Generally, out of 120 respondents interviewed, 106 had owned houses while the rest 14 respondents indicated renting houses. Based on the criteria set on categorizing the respondents, the study findings identified 65 households as poor and only 41 as relatively non – poor households. Thirty nine percent and 61% of poor households identified in water rich and water scarce areas respectively.

For relatively non- poor households, 61% and 39% reported from water rich and water scarce villages respectively (Table 22). Based on the poverty categorization used in this study, no household indicated under extreme poor category in both, water rich and water scarce villages.

Table 22: Features of respondent houses (N = 120)

Category	Water rich		Water scarce		Total	
Poor people	**No**	**%**	**No**	**%**	**No**	**%**
House walls						
Mud only and unburnt bricks	25	39	40	61	65	100
House floors						
Sand /earthen	19	31	42	69	61	100
House roofing						
Grasses	6	35	11	65	17	100
Non – relative poor people						
House walls						
Burnt bricks and cement blocks	25	61	16	39	41	100
House floors						
Cement	31	69	14	31	45	100
House roofing						
Iron sheets	45	51	44	49	89	100

Based on this study, it has been observed that, households in water scarce areas were categorized with poor quality as compared to households in water rich areas (Table 18). Only 31% of households in water scarce villages owned houses with cemented floors while in water rich villages about 69% of households owned houses with cement floors (Table 18). Also on roofing cases, 35% and 65% of houses in water rich and water scarce villages respectively were thatched with grasses. This may be probably contributed by low

household incomes earned from those water scarce villages and the difficulties of accessing water for making bricks particularly in dry season. Bricks for building usually prepared in dry season and in that season most areas are much faced with the problems of accessing water for productive and domestic purposes.

4.4.4 Household assets

Asset is among of indicators used in measuring the status of poverty at household level (Alavapati and Gill, 1995). It is an economic and social condition that is more determined and common than income. In this research various types of assets and other household properties were used to compare the wealth between water rich and water scarce respondents. The respondents were asked to mention the assets and other household properties owned. The assets and household properties owned by respondents included bicycles, houses, motor vehicles, land, radios, television, sofa set, hand hoe, grains milling machines, oxen plough, and livestock.

The total value of assets and other household properties owned by an individual was analyzed by using statistical T-test .The statistical T-test analysis was applied in order to compare the mean value of assets owned by respondents from water scarce and water rich villages. Results of T- test analysis (Table 23), show significant difference between mean values of assets of respondents from water rich and water scarce villages ($P<0.05$). On average the value of assets per household was about 3,106,758Tshs in water rich and 1,921,243 Tshs in water scarce areas.

Table 23: Mean value (Tshs) of household assets

	Respondents	Mean value	T- test	P - value
Water rich	60	3 106 758	2.254	0.026
Water scarce	60	1 921 243		

These findings indicate that households from water rich villages reported high value of household assets compared to households from water scarce villages. In this study, high quality household assets such as motor vehicles and milling machines were identified in water rich villages and seldom in water scarce areas. This may be contributed by the low income experienced by individuals in water scarce areas. This implies that acquisition of high valuable assets was hindered by financial constraints faced by individuals in water scarce areas. The low income earned in water scarce areas as reported by respondents was directed for subsistence of household daily life including purchasing water for domestic purposes.

4.4.5 Major households expenditure

There are many alternatives uses or expenditure of earned household income. School fees, buying water for domestic purposes, acquisition of livestock and farm inputs, building modern houses, buying household facilities as well as investing in savings for future support were identified by interviewed respondents as the main uses (Table 24).

Table 24: Main household income expenditure (N = 120)

Money use	Villages							
	Kilolo	Lulanzi	Sub-total	Vitono	Kipaduka	Sub-total	Total	%
School fees	23	13	36	21	18	39	75	26.0
Buying water	0	1	1	23	24	47	48	16.6
Livestock/ farm inputs	14	17	31	11	10	21	52	18.0
Modern houses	9	11	20	1	2	3	23	8.00
Household facilities	25	24	49	16	6	22	71	24.6
Savings	14	5	19	0	1	1	20	7.00
Total	85	71	156	72	61	133	289	100

NB: Frequency do not add to 120 because of multiple response

Out of 120 respondents interviewed, 75 (26%) put school fees as their most preferred priority and only 20 (7%) respondents recognized savings as their major priority (Table 24). Generally none and only one respondent used part of their household income for buying water in Kilolo and Lulanzi village respectively. In Vitono and Kipaduka villages 23 and 24 respondents out of 60 people interviewed indicated allocating some of their income in buying domestic water. Other uses of money at household as mentioned by respondents were buying livestock and farm inputs (18%), buying household facilities (24.6%) and building modern houses indicated by eight percent of respondents interviewed.

These findings imply that, 47 households out of 48 households indicated buying water were identified in water scarce villages (Vitono and Kipaduka) whereas only one (1) household out of 48 households reported buying water in water rich (Lulanzi) village.

Those villages as reported by respondents used large part of their earned incomes on buying water for domestic purposes compared to those water rich villages (Kilolo and Lulanzi) (section 4.4.3). Therefore the study revealed that, inadequate domestic water supply contributed to poverty in the study area, because that amount 16.6% (0.3 % from water rich and 16.3% from water scarce) of households income used for buying water could be worth located to other households economic productive investment.

4.5 Causes, effects and measures of insufficient domestic water supply

4.5.1 Causes of insufficient domestic water supply

Respondents were requested to mention the causes of insufficient domestic supply in their respective households. This was particularly directed to respondents from water scarce villages (Vitono and Kipaduka). The study findings as in Table 25 show that the major causes identified included : long distance to water sources from respondents' households reported by (42.5%); lack of knowledge on harvesting rain water and preserving techniques (14.2%); lack of reliable water sources within the village (25.7%); shortage of large quantity containers for domestic water storage facilities (4.4%); irresponsibility of village leaders on water related matters (12.4%) and poor means of domestic water transport especially those used by women was about one percent.

Table 25: Causes of insufficient domestic water supply at household (N = 60)

Cause	Responses	Percent
Long distance to water sources	48.0	42.5
Lack knowledge on harvesting rain water	16.0	14.2
Lack of reliable water sources in the village	29.0	25.7
Shortage of water storage facilities at household	5.0	4.4
Irresponsible of village leaders	14.0	12.4
Poor means of water transportation	1.0	0.9
Total	**113.0**	**100.0**

NB: Frequency do not add to 60 because of multiple response

The findings, implies that long distance to water sources from residential , lack of reliable water sources within the village and lack of knowledge and skills on harvesting rain water were the main causes of inadequate domestic water at households in Vitono and Kipaduka villages (Uhambingeto ward).

4.5.2 Effects of insufficient domestic water supply

In this study household respondents were asked to explain the effects emanated from inadequate domestic water supply at household. The findings show that the most effects reported by respondents interviewed were: decrease of household income (section 4.9), rise of household expenditure (Table 19& 24); pupils' performance (Appendix 3) health problems; social conflicts and women workload (Table 26).

4.5.2.1 Primary schools performance

Respondents were asked to mention the effects of inadequate domestic water supply to primary pupils academically performance. All respondents (100%) interviewed reported that pupils mainly girls were academically affected from water scarcity. Pupils particularly girls spent more time than boys on fetching water after school hours and during weekends.

Also most boys used bicycles as means of domestic water transportation while most girls indicated carrying water on their heads (Table 16).

That time spent for water could be importance located for performing academic matters. The situation hold true even in water rich areas where pupils especially girls were tasked most household chores which in turn weakened their academic performance. The respondents' response was supported by the year 2007 standard seven National Examination results (Appendix 3). The results show that 66% and 44%, 78% and 47%) of boys and girls respectively passed the examination in Kilolo and Lulanzi (water rich) villages. In Vitono and Kipaduka (water scarce) villages 79% and 59%, 67% and 63% of boys and girls respectively indicated the passed the examination (Appendix 3).

The findings from this study agrees with the study done by FAO, (1996) which noted that in most rural areas, the most time-consuming activities of women are fetching water and fuel wood. In some cases, women also pass of the burden of those activities to their children usually female children. Relieving women from such drudgery as fetching water would allow them to have more time for productive work and enable their children to attend school. Therefore; inadequate water supply is among of factors which contributed to poor academic performance of pupils particularly girls in the study area.

4.5.2.2 Other water related problems

Other water related problems mentioned by the respondents in this study were health problems (stomach diseases, skin diseases, diarrhea and typhoid), increased social conflicts and women workload. Skin disease was the common reported problem in both villages followed by diarrhea. Out of 33 respondents reported the problem of skin

diseases, 17 and 16 respondents were from Vitono and Kipaduka village respectively. For diarrhea cases, out of 20 respondents, 8 and 12 respondents were reported in Vitono and Kipaduka village respectively.

All 60 respondents interviewed in water scarce villages (Vitono and Kipaduka) reported that social conflict has increased particularly to women during queuing for water services because in that situation some women (late comer) wanted to bypass others who get early at water sources. Also social conflict has occurred among household members especially when one member of the household used domestic water for unprioritized uses such as frequency washing clothes or taking bath. In these villages it has been reported that washing clothes was normally undertaken once or twice per two weeks and were conducted at water sources in most cases so as to cope with water shortages.

Table 26: Effects of inadequate water supply at household (N = 60)

Effect	Responses		
	Vitono	kipaduka	Total
Decrease of household income	29	31	60
Increase household expenditure	29	31	60
Decrease pupils performance	29	31	60
Health			
Stomach diseases	4	1	5
Skin diseases	17	16	33
Diarrhea	8	12	20
Typhoid	0	1	1
Increase of social conflicts	29	31	60
Increase of women workload	29	31	60
Total	174	185	359

NB: Frequency do not add to 60 because of multiple response

The findings on women workloads agrees with studies done by Rogers (1980) and World Bank (1996) which recognized the women workload, they had noted that rural women have not single but triple roles, as domestic managers, economic producers and social service managers. For that reason the study observed that under appropriate conditions,

easier access to water for domestic use may therefore provide women with water and more time for all three gender roles (domestic, economic and managerial).

4.5.3 Measures against insufficient domestic water supply at household

In this research, respondents were requested to give their opinions towards combating the problem of insufficient domestic water supply at their respective households. This part of questions was particularly directed to respondents drawn from Vitono and Kipaduka villages which are characterized with water scarcity. Seventy five percent of responses indicated installation of tap water (development of water supply systems) in the village from reliable water sources (intakes) which will reduce water problems. Fifteen percent, 7.7% and 1.3% of responses indicated knowledge and skills on harvesting and storage techniques of rain water; acquisition of large quantity water storage containers at household level and improving the means of domestic water transportation from sources to homes will reduce water problem for domestic purposes.

Table 27: Respondents measures against domestic water problem (N = 60)

Measure	Responses	Percent
Install (improve water supply systems) tap water from reliable source	59.0	75.6
Acquire knowledge on harvesting rain water	12.0	15.4
Increase water storage facilities	6.0	7.7
Improve means of water transport	1.0	1.3
Total	78.0	100.0

NB: Frequency do not add to 60 because of multiple response

Furthermore, respondents reported that in Vitono and Kipaduka villages water should be installed from neighbouring villages with reliable water sources. For Vitono village the neighbouring villages with adequate water sources were Mawala and Ilula villages which ranged between 6 and 12 kilometres while Kipaduka village neighboured with Image and Ilula villages with reliable water sources located 5 to 8 kilometres**.** Amongst other factors,

financial constraint was reported by respondents interviewed as the main hindering factor on installing tap water in Vitono and Kipaduka villages from long distances (neighbouring villages) with adequate water sources such as from Image ward to Uhambingeto ward.

Therefore, the study findings observed that supplying tap water to those villages from reliable water sources is a fundamental important for fighting against poverty at household level since it will increase individuals' time spend on IGAs and in turn raises household incomes.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the study findings, the following conclusions are made:

i) The target to ensure access within 400 metres to domestic water sources by the majority of population is yet to be achieved in Kilolo District Council. In Kilolo District only 37.5% of the interviewed households are located within 400 metres to domestic water sources. The NSGPR target is to increase the proportion of rural population with access to clean and safe water from 53% in 2003 to 65% in 2009/2010 within a distance of not more than 400 metres. This means in Kilolo District there is still a long way to achieve this target.

ii) One of the consequences of limited access to domestic water is the relatively more time spent in fetching water than in income generating activities. The problem is more serious for women and girls particularly during dry season.

iii) Limited access to domestic water supply has direct impact on household incomes. Households located within easy access to domestic water have relatively high incomes. High household income is one indicator of reduced poverty.

iv) Limited access to domestic water is mainly a result of lack of improved water supply systems in the villages and limited use of rain water harvesting technologies.

5.2 Recommendations

From the study findings and conclusion made above, the following recommendations are drawn:

i) Dependence on natural sources of water such as rivers and shallow wells for domestic water sources limit access to water especially during dry season; rain water harvesting technologies and proper storage techniques should be introduced at village levels. It is therefore recommended that the Kilolo District Council should include rain water harvesting in its development plans as one of the strategies for improving water sources at village levels. Village water committees should be involved in promoting rain water harvesting technologies through creation of awareness and training of various stakeholders.

ii) Development of water supply systems at village levels is a solution to increasing the proportion of population accessing water within acceptable distance. Villagers should be encouraged to include water projects into their development plans. This approach will shorten the pace to provision of wholesome water to households within 400 metres from water sources. The priority is potential although deserving more resources. Therefore, this should be implemented under cost sharing basis between the government, community of Kilolo and other donors if any.

iii) To enhance the availability and sustainability of rural domestic water supply that can have a positive impact on poverty reduction, the government and agencies concerned should put emphasis on both technical and community building capacity from grassroots levels. This will ensure sustainable management of rural water supply systems.

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APPENDICES

Appendix 1: Questionnaire for respondents

TITLE: DOMESTIC WATER SUPPLY AND POVERTY IN KILOLO DISTRICT, TANZANIA

SECTION A: GEOGRAPHICAL LOCATION

Ward ……..
Village ……
Date ……
Questionnaire number. ……
Name of respondent…….

SECTION B: HOUSEHOLD BACKGROUND INFORMATION

1.0 Marital status, occupation and position held at household

Sex	Age	marrital status	Main occupation	Position at hh level
1.Male		1.Married	1.Farmer	1.Head of household
2.Female		2.Single	2.Livestock keeping	2.Not head of hh
		3.Divorced	3.Government employed	
		4.Separated	4.Self employed	
		5.Widow	5.House Wife	
		6.Widower	6.Others (specify)	
		7.Cohabiting		

2.0 What is your household size ?

Male	Female	Boys	Girls	Others(specify)	Total

3.0 What is your literacy level?

None	Primary education	Secondary education	Others(specify)
	1.below std 7	1.Ordinary level	
	2.completed std 7	2.Advanced level	

SECTION C: ACCESSIBILITY AND RELIABILITY OF DOMESTIC WATER

4.0 What are the major sources of domestic water for drinking for your household?

1. Piped (tap) water, 3. Protected shallow wells

2. Rivers, 4.Others (specify)……..

5.0 What are the major sources of domestic water for other uses for your household?

1. Piped (tap) water, 3. Protected shallow wells

2. Rivers, 4.Others (specify)……..

6.0 Who are the owners of those domestic water sources?

1. Public, 3. Private

2. Institution 4.Others (specify)…….

7.0 Are those water sources reliable for the whole year?

1. Yes 2.No, if yes go to question 10

8.0 Where does your household get domestic water during water shortage season?

……
……
……

9.0 What is water storage facilities used at your household?

……
……..
…….

10.0 What is the distance from household to nearest domestic water sources?
(i.e 400M =30 minutes go and return)

	Distance in metres(M)
Domestic water source	1.Below 400m
	2.Between 400m-1000m
	3.Between 1000m-3000m
	4.Between 3000m-6000m
	5.Over 6000m(Specify)

11.0 Who is responsible for fetching water between the household members?

Activity	Responsible in dry season				Responsible in rain season			
	men	women	boys	girls	men	women	boys	girls
Fetching water.								
Means of water								
transportation:								
1.on head								
2.by bicycle								
3.wheelbarrow								
4.animals								
5.others(specify)								
Time spent/day								

12.0 How many hours household members spent on economic activities?

Main economic activity	Responsible				hours spent
	Men	women	boys	girls	
1.crop production					
2. agricultural activities					
3.livestock farming					
4.salaried employed					
5.business					
6.handcraft					
7.others(specify)					

13.0 How does your household access domestic water services?

1. Offered free 2.Sold

14.0 How much money the household spent on domestic water per day?

1. Tshs 50, 3. Tshs 200,
2. Tshs 100, 4.Over Tshs 200 (specify) ……..

15.0 What quantity of domestic water needed per household per day?

Unit measurement	Activity	Quantity(litres) per day
	1.cooking	
Bucket(20 litres)	2.washing clothes	
	3.bathing	
	4.washing dishes/utensils	
	5.drinking	
	6.gardening	
	7.others(specify)	

16.0 What water projects have been implemented in your area that you are aware?

Project name	Year	Duration	Sponsor

17.0 How did your household members participate in those water projects?

1. Participated in planning 2. Participated in implementation

3. Others (specify)……..

……

SECTION D: INCOME AND POVERTY

18.0 What are the major economic activities at your household?

Economic Activity	Responsible			Earned income per year(Tshs)
	Head of HH	Spouce	Both	
1.Salary				
2.Crop production				
3.Livestock production				
4.Small business				
5.Owning shops				
6.Others (specify)				

19.0 What are the major generating activities related to domestic water supplies?

……..

……..

20.0 What are the major uses of money earned at your household?

1. Buying household facilities 3. Buying livestock/farm inputs
2. Children school fees expenses 4. Building modern houses
5. Paying water and health services 6. Leisure activities
7. Others (specify)……

……..

21.0 Do you have your own house?

1. Yes 2.No 3.If NO explain…….

22.0 What are features of your house?

Materials used at each category		
(a) Extreme poor		
House wall	**House floor**	**House roofing**
1.Sticks and grasses	sand	Grasses
2.Sticks and Mud	Sand	Grasses
(b) Poor		
3.Mud only	sand	Grasses
4.Unburnt bricks	sand	Grasses
© Rich		
5.Burnt bricks	cement	Iron sheets
6.Cement blocks	cement	Iron sheets
7. Others(specify)		

23.0 What types of assets are owned at your household?

			Owner			User		
Asset	**Quantity**	**Value(Tshs)**	**male**	**female**	**both**	**male**	**female**	**both**
1.Bicycle								
2.House								
3.Motorvehicle								
4.Land								
5.Radio								
6.Sofa set								
7.Cattle								
8.Chickens								
9.Kitchens								
utensils								
10.Milling								
machines								
11.Television								
12.Hand hoe								
13.Exel plough								
14.Others								
(specify)								

SECTION E: EFFECTS OF DOMESTIC WATER SUPPLY

24.0 Is water supply adequate for your HH water needs?

1. Yes
2. No

25.0 What are the effects of inadequate domestic water supply on?

(a) Household income ……

……

(b) Household income expenditure……

……

(c) Children academic performance……

……

(d)Health……

……

(e) Social conflicts…….

……..

(f) Women workload……

……..

(g)Others (specify……..

……

26.0 What are possible causes of insufficient domestic water supply for your household?

……

……

27.0 What measures must be taken in order to overcome domestic water problem in you HH……

……....

Thank You for Your Cooperation

Appendix 2: Checklist for key informants

Ward ……

Village ……..

Date ……..

Checklist number ……..

1. What are the major sources of domestic water at your area?
2. Who are the owners of those mentioned domestic water sources?
3. What are the linkages between poverty and domestic water supply?
4. Who is responsible to fetch water for family uses in the district?
5. How many hours individuals spent for water collection per day?
6. How many hours household members spent per day for IGAs?
7. Who are the most vulnerable at household level from domestic water shortages?
8. What are the major causes of poverty in your area?
9. What are the causes of inadequate domestic water supply in your area?
10. What water projects are implementing or have been implemented at your area?
11. What is your suggestion for ensuring sustainable domestic water supply in Kilolo?

Thank You for Your Cooperation

Appendix 3: Standard seven (2007) National Examination results

	Done exams		Passed exams		Percent of passed	
Village	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
Kilolo	50	63	33	28	66	44
Lulanzi	36	38	28	18	78	47
Sub -total	86	101	61	46	71	46
Vitono	19	22	15	13	79	59
Kipaduka	30	35	20	22	67	63
Sub-total	49	57	35	35	71	61
Total	135	158	96	81	71	51

Source: DED-Kilolo, (2007)

Appendix 4: Linkage between MDGs and Water

MDG	Linkage with water
Eradicating extreme poverty and hunger	Access to water for domestic and productive uses (agriculture, industry, other economic activities), which has a direct impact on poverty and food security. Vulnerability to water related shocks including droughts. Impact of water scarcity on both irrigated and rain fed agriculture for increased grain production; for subsistence agriculture, livestock, fish and other foods gathered in common property resources; capacity to produce cheap food with impacts on nutrition in urban and rural areas.
Achieving universal primary education	Incidence of catastrophic but often recurrent events, such as droughts, that interrupt educational attainment particularly for women and girls; drought preparedness programmes.
Promoting gender equality and empowering women	Access to water, in particular in conditions of scarce resources, with important gender related implications, which affects the social and economic capital of women in terms of leadership, earnings and networking opportunities.
Reducing child mortality and improving maternal health	Improved nutrition and food security, which reduces susceptibility to diseases. Equitable, reliable water resources management programmes that reduce poor people's vulnerability to shocks, which in turn gives them more secure and fruitful livelihoods to draw upon in caring for their children.
Combating HIV/AIDS, malaria and other diseases	Access to water, and improved water and wastewater management in human settlements, which reduces transmission risks of mosquito-borne illnesses, such as malaria and dengue fever.
Ensuring environmental sustainability	Adequate treatment of wastewater, which contributes to less pressure on freshwater resources, helping to protect human and environmental health. Improved water management, including pollution control and water conservation, as a key factor in maintaining ecosystem functions and services.
Promoting global partnerships	Water scarcity increasingly calls for strengthened international cooperation in the fields of technologies for enhanced water productivity, financing opportunities, and an improved environment to share the benefits of scarce water management upon in caring for their children.

Source: UN-Water, (2007)

Appendix 5: Access to improved water source within 30 minutes (%)

	Percent population per Year								Targets	
CATEGORY	2000	2001	2002	2003	2004	2005	2006	2007	2010	2015
Rural	56.3	-	42	53	53.5	53	-	55.7	65	82.1
Urban	92.1	-	85	73	73	73	-	78.0	90	-

Source: PHDR (2005), URT (2006 b), URT (2006c)