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SCHOOL OF GRADUATE STUDIES
FACULTY OF CIVIL AND WATER RESOURCES ENGINEERING
WATER SUPPLY AND SANITARY ENGINEERING

MSC THESIS

ON

**WATER SUPPLY AND SANITATION OF FAGITA LEKOMAWOREDA RURAL
KEBELE, AWI ZONE, ETHIOPIA**

BY

Gizachew Kassahun

Advisor: Andinet Kebede (PhD)

Bahir Dar, Ethiopia

November, 2022

Declaration

This is to certify that the thesis entitled “**WATER SUPPLY AND SANITATION OF FAGITA LEKOMAWOREDA RURAL KEBELE, AWI ZONE, ETHIOPIA**” submitted in partial fulfillment of the requirements for the degree of Master of Science in **Water Supply and Sanitary Engineering** under **Civil and Water Resource**, Bahir Dar Institute of Technology, is a record of original work carried out by me and has never been submitted to this or any other Institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Name of the candidate

signature

Date

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Approval of thesis for defense result**

I hereby confirm that the changes required by the examiners have been carried out and incorporated in the final thesis.

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As members of the board of examiners, we examined this thesis entitled "WATER SUPPLY AND SANITATION OF FAGITA LEKOMAWOREDA RURAL KEBELE, AWI ZONE, ETHIOPIA" by Gizachew Kassahun. We hereby certify that the thesis is accepted for fulfilling the requirements for the award of the degree of Masters of Science in "WATER SUPPLY AND SANITARY ENGINEERING".

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List of Abbreviations

ADF	African Development Fund
CDC	Center for Disease Control and prevention
CSA	Central Statistical Agency
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focus Group Discussion
HDW	Hand Dug Well
HEP	Health Extension Programme
HEWs	Health Extension Workers
HHs	Households
JMP	Joint Monitoring Program
MDGs	Millennium Development Goals
MoH	Ministry of Health
MWR	Ministry of Water Resources
NGOs	Non-Governmental Organizations
SPD	Sprig Development
SPSS	Statistical package for social sciences
UN	United Nations
UNDP	United Nation Development Program
UNICEF	United Nation Children’s Fund
VIP	Ventilated Improved Pit
WEA	Water aid Ethiopia
WHO	World Health Organization
WSP-EAP	Water and Sanitation programme- East Asia and the Pacific
WSS	Water Supply and Sanitation
WSSCC	Water Supply & Sanitation Collaborative Council
WWC	World Water Council

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Abstract

The life expectancy and mortality rate of the country majorly depends on its domestic water supply and basic sanitation. In Ethiopia, especially in rural areas, where people still rely on unimproved water sources for domestic purposes, the water supply may be contaminated with waterborne and water related diseases. The current study was carried out in rural kebeles of Fagita Lekoma District of Awi zone in Amhara region to assess the water supply and sanitation. To address the objective, household surveys, field observation, focus group discussions and key informant interviews were conducted and analyzed. Both descriptive and qualitative methods were used to collect the primary and secondary data. To process, analyze and interpret the results of the data collected in 2013 EC from 150 household heads of rural kebeles, statistical package for social sciences (SPSS-23) program was used. In the district, around 25 % get access to water which is treated by chlorine. However, the rest which comprises almost 75% of the households get water from unprotected traditional hand dug wells, springs, and rivers which are contaminated water sources. These groups of the dwellers are highly exposed to water born disease. The majority of people in the district rural areas do not use the improved water schemes due to its inadequacy, long walking distance and long waiting time. The consequences of unimproved water use were in general negatively affecting the environment, health and economic development of a rural community in the district. An access to basic sanitation was also another challenging issue to these groups of the community. Around 76 percent of the community do not have pit latrine while the rest 24 percent have pit latrine. Generally, both poor accessibility of domestic water supply and sanitation were negatively affecting qualitatively on the environment, health and economic conditions of the district area.

Key words: Access to water, Development, mortality, sanitation, unimproved water, waterborne disease

CHAPTER 1.0: INTRODUCTION

1.1 Background of the Study

Access to a safe and affordable supply of drinking water is universally recognized as a basic human need for the present generation and a pre-condition for the development and care of the next (Lo, 2015). Access to and use of safe drinking water and basic sanitation can make an immense plays a role in health, productivity (economical) and environment of one's country

Safe drinking water and adequate sanitation are the basic right of every citizen and are vital for improving health and alleviating poverty(Wellington, 2015). An improved access to domestic water supply and basic sanitation has to be supplied where and when it is needed to the dwellers. A series of studies have shown that location and socio-economic status are the most pronounced factors for unequal access to improved drinking water (Damtew & Geremew, 2020). Though the majority of the rural water-insecure live in Africa and Asia, there are also small and enduring geographies of exclusion elsewhere in the world, including Australia, Europe, and North America, disproportionately affecting indigenous people and ethnic groups (Hope *et al.*, 2020). Due to the economic status and behavioral attitudes and educational status the majority of the world's population lives in Africa and Asia without access to an improved domestic water supply and basic sanitation. Access to safe drinking water supplies and sanitation services in Ethiopia are among the lowest in Sub-Saharan Africa (Tilahun et al.,2018). Many people in developing countries like Ethiopians continue to rely on unimproved water sources for their water demand and improper sanitation. Not only expanding an improved water systems but it also goes to its safety and adequacy of water to its dwellers and construct a toilet in a convent place and use it.

The researcher's initiation is to assess the current sources of drinking water supply used by people and basic sanitation situations and their effects on the district communities. Ethiopia's main objective of poverty reduction is by adopting the millennium development declaration. This resulted in prioritizing accessibility to improved water supply and basic sanitation to the dwellers. In 2005, the government of Ethiopia approved the Universal Access Program with the objective of providing safe water to all citizens of the nation. At the end of the first phase

of the Growth and Transformation Programme (GTP I), access to potable water for urban areas was 91% and access in rural Ethiopia was about 82% by the standards of GTP I (Adank *et al.*, 2018). Water supply coverage for rural areas by the standards of GTP I was 15 liter consumption per day per person (l/c/d) within 1.5 km radius, and 20 l/c/d in urban within 0.5 km radius. However, these figures go down considerably when lenses through GTP II standards (25 l/c/d within 1 km radius for rural areas and 40–100 l/c/d for urban areas); where rural, urban and national water supply coverage stood at 59, 51 and 58%, respectively (Adank *et al.*, 2018). Cognizant of this low coverage, due emphasis was given under GTP II to the expansion of potable water supply with a target to achieve 85%, 75% and 83% potable water coverage, respectively in rural areas, urban areas and the country as a whole by the end of GTP II (2019/20). Towards achieving the plan in rural areas, a great deal of investment was put into the construction industry of potable water points. The mid-term review of GTP II shows that potable water coverage has increased to 68.5% in rural areas, 54.7% in urban areas and overall coverage of 65.7% (Adank *et al.*, 2018).

A global concern issue in currents is access to safe domestic water supply and basic sanitation to the rural areas. However, developing countries, like Ethiopia especially in rural communities, have suffered from a lack of access to safe drinking water supply from improved sources and to adequate sanitation services (WHO, 2017). In the researcher's study district communities of Fagita Lekoma are still dependent on unimproved water sources like rivers, springs, and unimproved traditional hand dug wells. Since these water sources are open, they are highly exposed to flood and birds, animals and human activity contaminations. In addition, most sources are found near gullies where open field defecation is common and flood-washed wastes affect the quality of water (Meseret, 2012). In many rural communities of Ethiopia access to potable water supply and basic sanitation is still a great challenging problem of which my study district is no exception to this issue. The local government of the district has no given an attention which has made the communities to ensure safe and sustainable water resources systems and basic sanitation activities. Inadequate sanitation, and unclean water supply result not only in more sickness and death, but also in higher health costs, lower productivity, lower school enrollment and retention rates of girls and perhaps most importantly the denial of the rights of people to live with dignity (Berih, 2013). The

causes for disease of diarrhea under five children are mainly unavailability of wholesome drinking water supply and unavailability of basic sanitation.

1.2 Statement of the Problem

About 85 percent of the population of Ethiopia lives in rural areas. In Ethiopia, the spatial distribution of households using unimproved water sources have been incomplete or ignored in most of the studies(Damtew & Geremew, 2020). The major sources of drinking water for these rural populations are surface run offs, unprotected springs, rivers, and hand dug wells whose health risk is significant as they are exposed to contamination caused by human beings, livestock, wildlife and uncontrolled flooding. Access to safe drinking water is supplying water to the community, but the initiation must go to its quality, adequacy and safety. Teaching the community to create awareness about water quality issues coming related within it and associated with sanitation and others hygienic activities, is important to alleviate health effects but it stops below its standard coverage.

Parallel to the domestic water supply, sanitation is also a basic need and a way of ensuring health standards of the community. Lack of proper sanitation in the community is a serious health risk and affront to human dignity. People are forced to defecate in open fields, in rivers or near areas where children play and food is prepared because they do not have access to improved sanitation (WHO & UNICEF, 2017). In addition to fundamental human rights people also has the right to access water and sanitation. Both the effects of poor domestic water supply and improper sanitation facilities in the community have low economic development on the country. Continuous sustainable development of one's country in any aspects of civilization should go within assuring access to potable water supply and basic sanitation.

On the other hand, poor accessibility of domestic water supply and basic sanitation is a cause and an indicator of poverty. Lack of access to improved water supply causes higher infant mortality rates, low economic productivity (absenteeism and medicinal wages), and low female enrollment in school. These consequences are more serious in the rural populations that have virtually no sanitation facilities. Therefore, the issue of ease of access to potable water and basic sanitation has to get an attention from the responsible agent including the

community itself. Therefore, this study assessed the impacts of poor accessibility of domestic water supply and basic sanitation on the health status and economic wellbeing of the community in the district.

1.3 Objectives of the Study

1.3.1 General objective

The aim of this study is to assess the impacts of poor accessibility to domestic water supply and basic sanitation on rural development in Fagita Lekoma woreda, Amhara region, Ethiopia.

1.3.2 Specific Objectives

To realize the general objective, the following specific objectives were used as the operational steps:

- To assess the existing status of domestic water supply and basic sanitation of the district
- To assess factors hindering access to domestic water supply and basic sanitation of the district
- To assess the effect of poor accessibility of domestic water supply and unavailability of basic sanitation on the health, environment and economic status of the district

1.4 Research Questions

In line with the specific objectives of the study, the research tried to get answer to the following research questions:

- ❖ What is the current status of domestic water supply and basic sanitation in the district looks like?
- ❖ What are the factors hindering access to the domestic water supply and basic sanitation use of the district?
- ❖ What are the effects of poor accessibility to domestic potable water supply and basic sanitation on the health, environment and economic status in the district?

1.5 Significance of the Study

A research is crucial for formulating programs for the reduction of water born and water related disease like diarrhea morbidity, trachoma, typhoid and other incidences in rural Ethiopia. 75 and 76 percent of the poor provisions of domestic water supply and basic sanitation are the major challenges in the district respectively.

It is hoped that the findings of the study will provide information to improve domestic water supply and basic sanitation service delivery to the rural community of the district. In addition, the findings of the study will improve the existing water management mechanisms and suggesting ways of conducting it. It is also hoped that the study might initiate other researchers to conduct analogous research on water and sanitation.

1.6 Scope of the Study

The thesis basically focused on domestic water supply and basic sanitation in rural Ethiopia specifically at rural kebeles. It analyzed the effects of poor accessibility of domestic water supply and basic sanitation on environment, health and economy conditions of households in the sample study area sites. The study also investigated from the perspective point of view of what the domestic water supply and sanitation situation looks like by the community members, health extension workers (HEWs) and the district water desk officers. In order to evaluate the gathered data effectively and maintain the scope within a stipulated time and financial limit the study deals with a limited number of households and focused on effect of domestic water supply and basic sanitation on the rural communities' welfare, economy and environment.

Concerning to documents and secondary data in the visited office there were no adequate documents which were relevant to the study. In some extent there were a limited number of data recorded in the district office and HEWs sectors concerning water supply and sanitation respectively. The MSc research thesis confines only to issues of poor domestic water supply accessibility and improper basic sanitation health, economy and environmental impacts on rural areas.

1.7 Limitation of the Study

The study was limited because of poor access to domestic water supply and improper basic sanitation condition of rural Ethiopia. The other issue looked by the researcher procedure was the absence of enough measure of fund and duration. It was difficult to do the types of research without adequate quantity of cash, time and source. Another major issue to get sufficient and essential primary and secondary data was difficult.

1.8 Organization of the Thesis

This research paper is organized in five chapters. Chapter one states an introduction and covers background of the study, statement of the problem, objectives of the study, research questions, limitations of the study and organization of the thesis. Information on the previous works and empirical findings is properly examined and entertained in chapter two. The third chapter deals with the data source, data type, data use and area of study. On chapter four data presentation, analysis and discussion are made. Finally conclusions are drawn from the analysis of the data and recommendations are forwarded under chapter five.

CHAPTER 2.0: LITERATURE REVIEW

2.1 Implication of Potable Water Supply and Sanitation in Rural district

Improving wash services has been recognized as a fundamental factor for improving health and the driving forces of economic progress in developing countries like Ethiopia. Ethiopia is a country in which the water supply and sanitation infrastructure endeavors are still low (Meseret, 2012). *The consequences of unimproved water use were in general negatively affecting the environment, health and economic development of a rural community in the district.* Improving potable water supply and basic sanitation, together with hygienic practices can have significant effect on community health status. Improving safe water supply and basic sanitation minimizes the incidence of water borne and water related disease. This limits both mortality and dreariness rates and the number of working days lost; decreases work proficiency and avoiding medicinal expenses. These improvements can in turn lead to improved nutritional status and reduced morbidity and mortality, particularly under- five children.

Domestic water supply and proper sanitation infrastructure endeavors are still low in Ethiopia especially in rural areas. Safe domestic water supply is a fundamental human need and comprises with the most imperative human rights. Individuals live and vocations rely upon the safe water supply. In this condition accessible, wholesome and available supplies of potable water correlative to basic sanitation are really basic and essential necessity parts of major quire services for the rural population.

As indicated by water supply and sanitation (WS&S) program, a maintainable enhancement in water supply and basic sanitation situation is fundamental to:

- ❖ Limit income failure due to unreasonable time vitality spent in gathering water.
- ❖ Reduce the cost of social insurance benefits specifically for waterborne and related disease for example Diarrhea, Guardia, Typhoid, etc.
- ❖ Increase their salaries from dairy cattle that rely upon water.
- ❖ Enhancement the personal satisfaction of the poor through, to make a constructive effect on maternal and child medicinal services, improvements of in school enlistment

and participation, limit home obligations and time spent on water collecting for females and children.

Table 2.1: Transmission Routes of Water-Related Diseases

Classification	Transmission route	Examples of diseases transmitted
Waterborne	Through ingestion of pathogens in drinking water	Diarrheal diseases Enteric fevers, such as typhoid Hepatitis A
Water-washed	through incidental ingestion of pathogens in the course of other activities; results from having insufficient water for bathing and hygiene	Diarrheal diseases Trachoma Scabies
Water-based	through an aquatic invertebrate host; results from repeated physical contact with contaminated water	Guinea worm Schistosomiasis
Water-related insect vector	through an insect vector that breeds in or near water	Malaria (parasite) and Yellow fever (virus)

Source: (Muhammed, 2016)

Every year, millions of the world’s poorest people die from preventable diseases caused by inadequate water supply and sanitation (WS&S) services (Water & Services, 2011). The main cause for Diarrhea is drinking water which is polluted with bacteria and chemicals (Rehman, 2019). According to the study of Murray (2015) the most cause of morbidity and mortality for children under 5 years is diarrhea and the incidence of diarrhea is so profound among children under 5 years that it is the second leading cause of death in children under five years old.

Diarrhea is both a waterborne as well as a water-washed disease, and it can be caused by ingesting water contaminated with human and animal excreta which contain pathogenic agents or ingesting these pathogens directly through various fecal-oral pathways. Human and animal

excreta are the main sources of most disease causing pathogens to human beings. As the figure illustrates, these pathogens are transmitted from an infected host to a new person via various transmission routes. They are transmitted through fecal-oral routes via fluids, hand contact, flies and food. The figure also shows the importance of sanitation and safe removal of human feces as a primary barrier to prevent these pathogens from reaching the domestic environment. Good hygiene practices and household water treatment also serve as a secondary barrier to prevent the transmission of diseases-causing pathogens. For example, washing hands with soap after defecation and contact with child stools and before eating and preparing food stop the transmission of disease agents because the source of the diarrhea pathogen is removed. Therefore, washing hands with soap can significantly reduce the burden of diseases associated with feces and polluted water. The secondary barriers are extremely important when sanitation services are inadequate and feces are disposed of into the domestic environment (Muhammed, 2016).

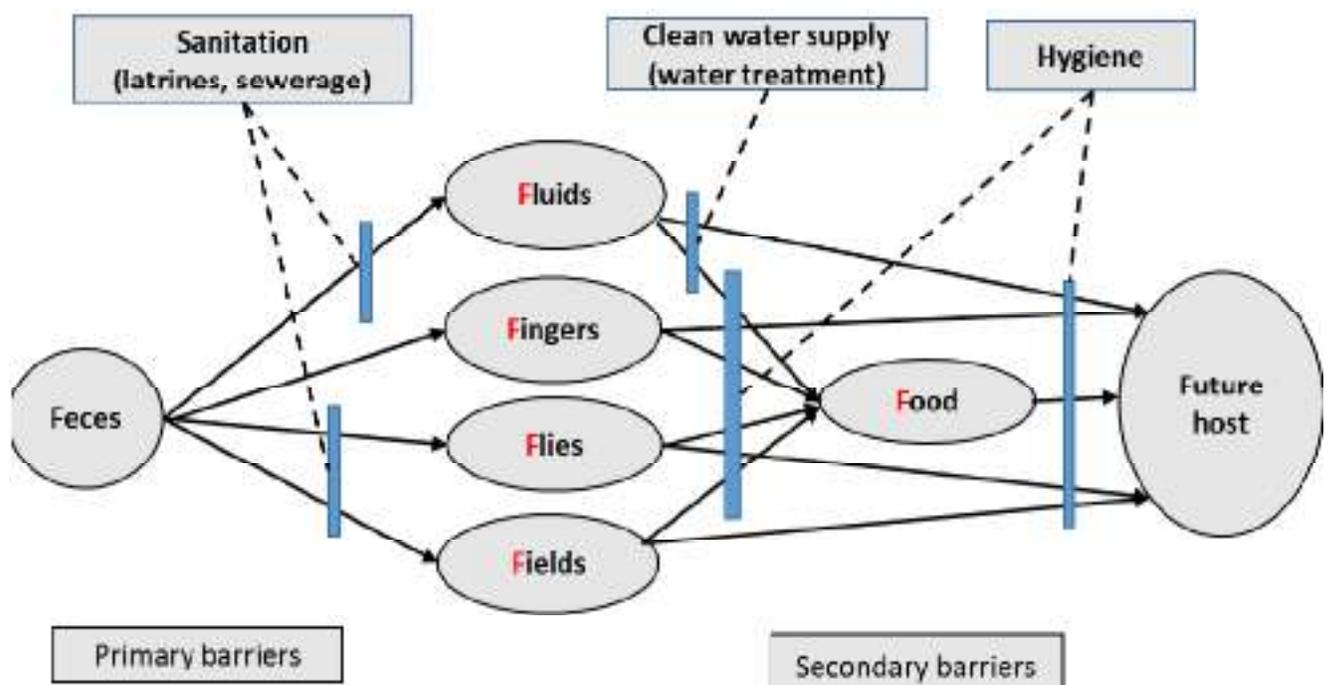


Figure 2.1: the “F-diagram” pathways of fecal disease transmission and the barriers(Source: Muhammed, 2016)

Graphically it looks like this.

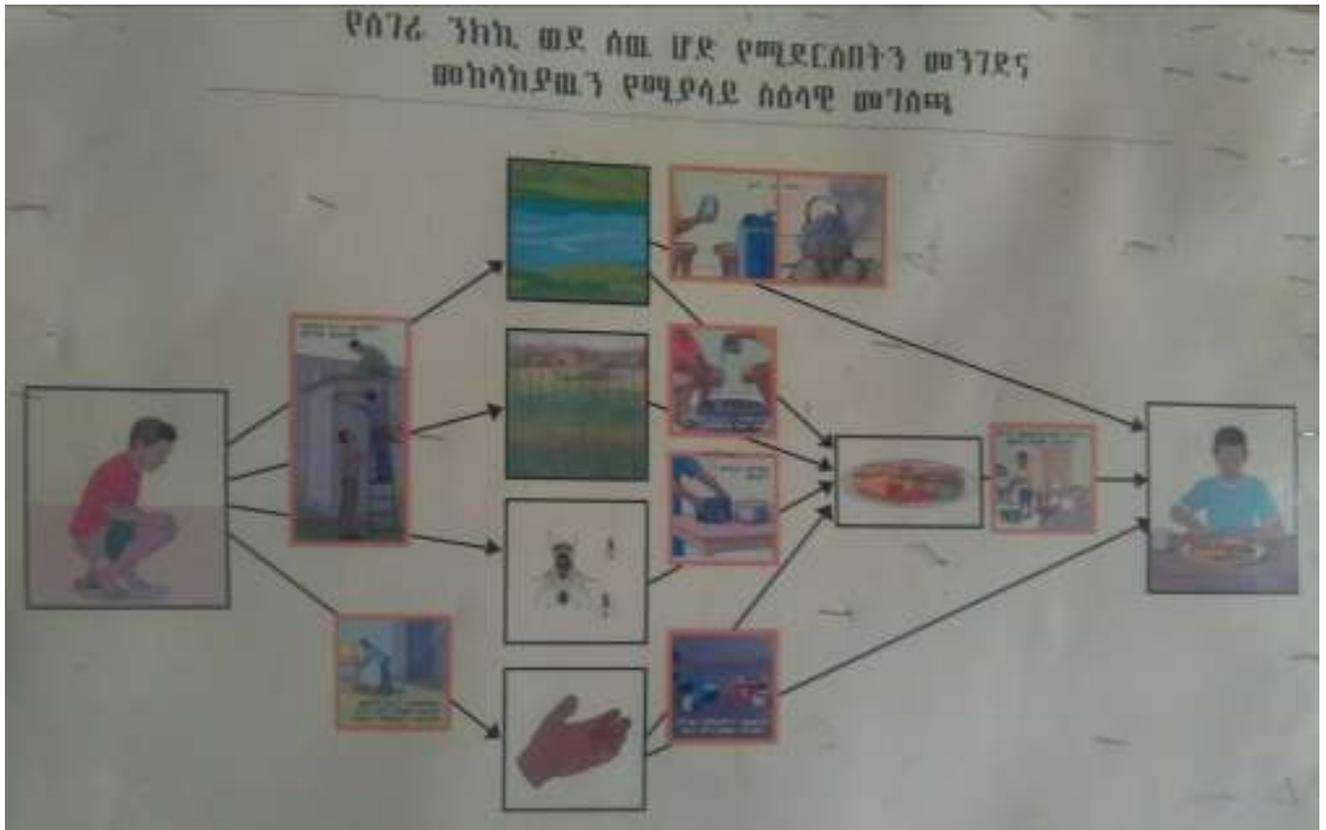


Photo 2.1: human excreta pathogens and their preventive measures

Water is a fundamental life-support, which cannot be treated as a commercial commodity with supply and demand manipulated to increase its value and with alternatives that can be substituted (Beriha, 2013). Water is a public trust issue and which is not be privatized. The United Nations Committee on Economic, Social and Cultural Rights has elaborated specific rights, roles and responsibilities at different levels and it provides an enforceable framework for recognizing water as a human right. By stating the Governments must assert their primary responsibility for providing and regulating water and sanitation services.

The human right to sanitation entities everyone has to sanitation services that provide ensure dignity and that are physically accessible affordable, safe, hygienic, secure, social and culturally acceptance.

2.2 Domestic water supply in Rural Ethiopia

For every rural residential use, a specific amount of drinking water must be accessible. In any case, there is a problem to distinguish an obvious least measure of drinking water for every residential action. For the manageability of life to continue on earth, a base amount of water is required of water by a human body. The daily necessity of drinkable water supply per individual for their fundamental needs is 20 to 50 liters for each day, yet more than one out of six individuals do not approach such measures of potable water (Yitbarek, 2019). The rural zone has more difficulties in conditions as it covers only more of the total country populations. In this case, the rural residents are more vulnerable to neediness, illnesses and also cause passing through more than a huge number of individuals consistently. Among those community children and females are severely exposed to the disease. Sufficient drinkable water supply for household use particularly is frequently utilized as real estimating the dimension of the economic development and medicinal services status of the population. The water supply required for all person; therefore, water must be satisfactory, protected and free from any unsafe smaller scale living beings, mixture substances and radiological dangers that may establish a risk to a man's wellbeing. It must be likewise worthy as far as shading and smell so personality will pick it instead of dirtied options that may look more attractive water.

Subsequently, satisfactory and protected drinking water supply is one of the essential for individuals to live on the land, will medicinal services and be profitable from their work. In any case, huge quantities of the total population meet deficiencies of these important needs. Unimproved water has been shown to lower the health risks related to bilharzia, trachoma, intestinal helminthes and other water related diseases (Berih, 2013). In addition, improved water is likely to reduce the burden of disease related to other major health issues by reducing the average stress level for the immune system, and thus strengthening the resistance to respond to new infections.

When the researcher notice, by the Joint Monitoring Program (JMP) explained in 2016, local water supply in rural Ethiopia is affected individuals' health, education, generation, keeping the country from achieving its development by various ways, since expansive quantities of a population as yet drinking and uses for different local exercises hazardous water sources (Kumar, 2018).When infected with these waterborne diseases, those living in rural Ethiopia

communities suffering from water scarcity cannot contribute to the community's productivity and development because of a simple lack of strength. Additionally, economic resources are drained by the cost of medicine to treat waterborne diseases, which takes away from resources that might have been used for food or school fees (Beriha, 2013).

Most of the time this influence ladies and children of the rural country. The essential water deficiency is proficient when the populations have no more effects on domestic water supply, for instance, the absence of proper access to water-related management and powerlessness to the water-related impacts, like waterborne and water-related diseases (Yitbarek, 2019).

2.3 Access of Domestic Water Supply

The cost of water collection in rural areas is usually in time and effort rather than in money paid to vendors (Cairncross & Valdmanis, 2012). The basic needs and rights of individuals is an access of sufficient and safe domestic water supply as air. Currently in rural community Per capita water demand is below 20 liters for every individual for every day. Safe drinking water supply is an imperative to human and other life which lives on the land, despite the fact that it cannot contain calories or natural supplements Safe drinking water supply coordinated with enhanced hygiene and sanitation addition to the general wealth of population; it has critical behavior on death rate, life span, and efficiency. Still in Ethiopia, both rural and urban settlements do not satisfied by domestic water supply in access and quality.

Access to safe water is the offer of the population with functional access to sufficient measures of clean water supply, safe water including treated surface water and treated groundwater however uncontaminated water, for example, spring and boreholes (Yitbarek, 2019). A sufficient measure of water is expected to fulfill metabolic, hygienic, sanitation and local necessities normally around 20 liters of safe water supply per individual every day. This smallest amount of water anyway changes relying upon whether it's a rural area or an urban region and whether warm or atmosphere condition around the territories. Due to this reason the Africa water development report in 2016 that clarified as essential human water should be 20 to 50 liters for every individual of protected and uncontaminated water day by day. The WHO in 2016 reports that damaged drinking water supply causes about 1.8 million persons to pass on for diarrheal illnesses every year around the world. Ethiopia is a country in which the

water supplies, hygienic and sanitation framework is low still nowadays. According to the Yitbarek (2019) the significant issues are environmental change, monetary status, human obstacle being developed exercises, worldwide monetary and nations, specialized issues, water consumption, water sources and money related are influences water administration direct or indirect. The significant poverty in underdeveloped countries including Ethiopia can be specifically connected with the absence of openness of water supply.

Among African countries are enriched with common water resources, yet most noteworthy quantities of the population, fast extension of urban areas, and absence of access to satisfactory and protected and drinkable water supply earlier its accessibility there are political and regional problems that anticipate better dispersion arrangement of this water supply administrations.

2.4 Sanitation

Sanitation is broadly defined as the management of human excreta, solid waste and drainage (Murray, 2015). It is also the provision of toilets, health education aimed at changing personal attitudes and practices, the disposal of waste water, at household or at municipal level, solid wastes (household refuse, industrial waste), and also include the whole range of environmental issues.

According to Beriha (2013) sanitation refers to the hygienic principles and practices relating to the safe collection, removal or disposal of human excreta, refuse and waste water, as they impact upon users and the environment. The researcher adopts that the term adequate sanitation refers not only to facilities on the site of a household (toilets) and to any pipes, treatment works etc which may be part of a public or communal disposal system, but also to the successful operation of the facilities and system. National sanitation task team (2018) also defined adequate sanitation as about both physical facilities (toilets and associated system requirements) and practice.

‘Unimproved’ is defined by (WHO & UNICEF, 2017), toilets include flush toilets that deposit in or nearby the dwelling, hanging toilets, latrines, or the complete absence of facilities. World Health Organization (WHO, 2017) defined sanitation as group of methods to collect human excreta and urine as well as community waste waters in a hygienic way, where human and

community health is not altered. Sanitation aims to decrease spreading of diseases adequate waste water, excreta and other waste treatment, proper handling of water and food and by restricting the occurrence of causes of diseases. Sanitation is a system to increase and maintain healthy life and environment. Its purpose is also to assure people enough clean water for washing and drinking purposes.

UN's World Summit on Sustainable Development in 2002 defines basic sanitation as follows;

- ❖ development and implementation of efficient household sanitation systems
- ❖ improvement of sanitation in public institutions, especially in schools
- ❖ promotion of safe hygiene practices
- ❖ promotion of education and outreach focused on children, as agents of behavioral change
- ❖ promotion of affordable and socially and culturally acceptable technologies and practice
- ❖ development of innovative financing and partnership mechanisms
- ❖ integration of sanitation into water resources management strategies in a manner which does not have negative impact on the environment

As Betelhem (2011) stated the conventional approach have three systems for managing human waste. These are:

- ❖ **'Do nothing' system:** in this system there is no defined method of waste management and no technologies used. In this approach people give due consideration to human health by removing excreta far from the immediate dwelling areas but they do not consider the environmental health issue. Example: open defecation
Problems faced by people practicing open-defecation were similar in terms of frequency of responses for both member and non-member households (Murray, 2015).
- ❖ **'Drop and Store' system:** in this system the excreta is simply collected in a hole out of sight and stored for an indefinite period. Example: pit latrine.
- ❖ **'Flush and Discharge:** system: this system uses water to transport human excreta through underground sewers to treatment facilities where the 'pollutants' in the waste water are removed and using a combination of physical, biological and chemical

processes before the treated water can be discharged into the environment. This approach is mostly applicable and effective in the developed worlds.

According to the above writer, the disadvantages of the first two approaches are environmental degradation through soil and water (underground and surface) pollution and the exposure of human and animals to the pathogenic organisms in human excrement and the consequent spread of diseases. When we look at the sanitation of developing countries from the perspectives of the above approach, ‘do nothing’ and ‘drop and store’ systems are the most common conventional approach as applicable in the developing world.

2.5 Water Supply and Sanitation in Rural Ethiopia

Most the world’s poor population lives in rural areas. Thus, if economic development is to be achieved, an attention should be given to rural water supplies and sanitation since any development activities addresses the poor community. According to different studies access to potable water supply and basic sanitation improvements from previous years in percent. Most about 85% Ethiopians live in rural areas. The World Bank has outlined some challenges in scaling up the ease of access of the rural potable water supply and basic sanitation (Betelhem, 2011). The issue is “how to scale up or increase domestic water supply and basic sanitation to those rural communities”? To address the question as Ethiopia is a poor country she get assistance from World Bank to address the issue of domestic water supply and basic sanitation to the rural areas achieving MDGs. The approach taken is different between urban and rural areas. In urban areas water boards have been established to have responsibility for increasing the water supply and sanitation. There are rural areas which consider having ease access to potable water and basic sanitation as a privilege rather than as a right.

Infrastructure construction is another and key problem in providing rural water services and increasing basic sanitation to rural areas. Ease of access to potable water and basic sanitation is one type of infrastructure which also depends on the other types of infrastructure like roads. Thus, the unavailability of such infrastructure is a challenge to any private or government organizations.

2.6 Benefits of Improving Access to Water and Sanitation

Public health will be guaranteed if there is access to potable water and basic sanitation since the highest causes of illness and death in developing country is related to poor access potable water and basic sanitation. As a result of this, illness and deaths reduce the productivity of the economy of a nation; poor sanitation has an adverse effect on the environment which in turn may affect the source of the economy like agriculture and tourism.

As a result, the improvement on water supply and sanitation has a direct and concrete impact on health. Since diarrheal diseases are highly associated with unsafe drinking water and sanitation and poor hygiene, the improvements in water and sanitation would have a significant outcome.

The improvements in water supplies and sanitation also have an impact on poverty and economy, as it is logical that only healthy people are strong enough to work and fulfill their needs.

As Betelhem et al., (2011) stated the improvement to water and sanitation will have economic benefits of three types:

- ◆ Direct economic benefits of avoiding diarrheal diseases
- ◆ Indirect economic benefits related to health improvements
- ◆ Non-health benefits related to improvements in water and sanitation.

The direct economic benefits of avoiding diarrheal diseases include cost savings due to the reduced incidence of diarrheal disease, full healthcare costs, and non-health sector direct costs. The indirect economic benefits include productivity effects of improved health and the non-health benefits.

Table 2.2: Primary and economic impacts associated with improved sanitation options

Improvement	Primary impacts	Economic impacts
closer latrine access and improved latrine population ration	<ul style="list-style-type: none"> ➤ less open defecation ➤ less latrine access time ➤ intangible user benefits ➤ improved health status due to less exposure to pathogens ➤ less use of public latrines 	<ul style="list-style-type: none"> ➤ saved health care costs ➤ improved aesthetics(visual effects and smells) ➤ increases school participation ➤ better living standards ➤ household income rises ➤ labor productivity ➤ value of saved lives

Source: WSP-EPA, 2011

2.7 Water and Sanitation versus Productivity and Development

Poverty is directly related to the accessibility of clean drinking water supply, without it the chance of breaking out of the poverty trap is extremely slight. The economic consequences of lack of clean water penetrate into realms of education, opportunities for gainful employment, physical strength and from health, agricultural and industrial development, and thus the overall productive potential of a community, nation, and region. Hundreds of millions of others, both children and adults, suffer ill health and disability that under in their quality of life and hopes for the future. These most serious environmental health facing the world's population today, stem mostly from traditional problems such as a lack of clean water, sanitation, adequate housing, and other insect and animal disease vectors. Poverty also influences health because it largely determines an individual's environmental risks, as well as access to resources to deal with those risks. Throughout the developing world, the greatest environmental health threats tend to be those closest to home.

National governments are very aware of the expenditure needed to increase the access to improved water and sanitation but they are not curious about the economic costs of the negative consequences of unimproved water and sanitation. If the world population had access to safe drinking water and appropriate sanitation, the child mortality rate would be minimized. As a result of poor water and sanitation many people in the world are insecure; additionally potable water and basic sanitation is the easily preventable way of reducing child mortality. Access to clean water and sanitation is also a means to reduce health related costs, improving girl's education, and it also ensures a sense of human dignity. Generally, access to clean water and improved sanitation "can make or break humandevelopment"and it is a condition for all human development goals achievement.

2.8 Reasons for Poor Sanitation

It is obvious that human waste is potentially hazardous material to human being which needs to be managed properly. But there are some factors which may prohibit people from adopting latrine services, of which economic reason to be listed as the main and the first is behavioral change about its consequences. Poor people rely on subsistence income, of their income they prefer to spend on food and goods, than spending it on latrine construction. Of course it could be expensive to build a latrine for someone who doesn't secure his food.

Though economic status inhibits people to build their own latrines, people do not realize the costs they spend on treating diseases cause of unsanitary environment, which the costs for curing might be higher than preventing. Thus, if people had aware of the consequences of unhealthy environment, the costs to prevent its consequences like diarrheal diseases would be the easiest than treating the diseases. So investing on latrine is also a means of minimizing expenses of medication comes after unhealthy living environment because of poor sanitation so as to increase economic development of the community.

Lack of proper sanitation causes diseases. Most of the diseases resulting from sanitation have a direct relation to poverty.

The lack of clean water and poor sanitation causes many diseases and the spread of diseases

- ❖ Lack of information
- ❖ Lack of coordination
- ❖ Lack of political and budgetary priority, lack of demand

- ❖ Lack of human and technical capacity
- ❖ Lack of service providers
- ❖ Lack of arrangements for cleaning and maintenance

According to Betelhem (2011), there are socio-cultural reasons why people do not adopt latrine use; ‘what is dirty and clean can vary from culture to culture’. Many people especially rural community picture latrines as evil and dirty places. As a result people may prefer to defecate openly away from their houses in the fields which are considered more sanitary. Both the economic and socio-cultural reasons for unimproved sanitation do not outweigh the costs of the consequences.

2.9 Inadequate Sanitation and Its Effect

Poor sanitation not only adversely affects the availability and quality of water, but also has the same harmful effects on education, on welfare, on tourism, and on people’s time-use and life opportunities in general (Murray, 2015). The inadequate facilities, combined with unhygienic practices and a general lack of formal water supplies, as well as safe disposal of other domestic waste water, represents Ethiopia’s sanitation problem.

Health effect– according to Murray (2015) most diseases related to poor sanitation have been labeled ‘water-borne’ diseases but many communicable diseases have fecal origin rather than water that acts as a medium to spread diseases. The impact of the conditions, on the health of the rural poor is significant in terms of the quality of life, the education and development potential of communities, although difficult to determine accurately (Betelhem, 2011).

Economic effect- the effect on household economies is serious, keeping families in the cycle of poverty, illness, illiteracy and lost income. The national cost of lost productivity, reduced educational potential and curative health costs is a major drain on the local and national economy (Beraha, 2013).

Environmental effects- inadequate sanitation leads to dispersed and diffuse pollution of water sources.

CHAPTER 3.0: MATERIALS AND METHODS

3.1 Description of the Study Area

The study was conducted at Fagita Lekoma woreda, Awi zone, Amhara Regional State of Ethiopia. Its relative location is southwestern portion of the region and north western portion of the country, Ethiopia. It is around 465 km far from the capital city of Ethiopia, Addis Ababa and 96 km from Bahir Dar, the capital town of Amhara Regional state. Geographically, it is found between $10^{\circ}57'23''$ - $11^{\circ}11'21''$ N latitude and $36^{\circ}40'01''$ - $37^{\circ}05'21''$ E longitude. As indicated by the woreda's organization the total area of the woreda was about 67950 km².

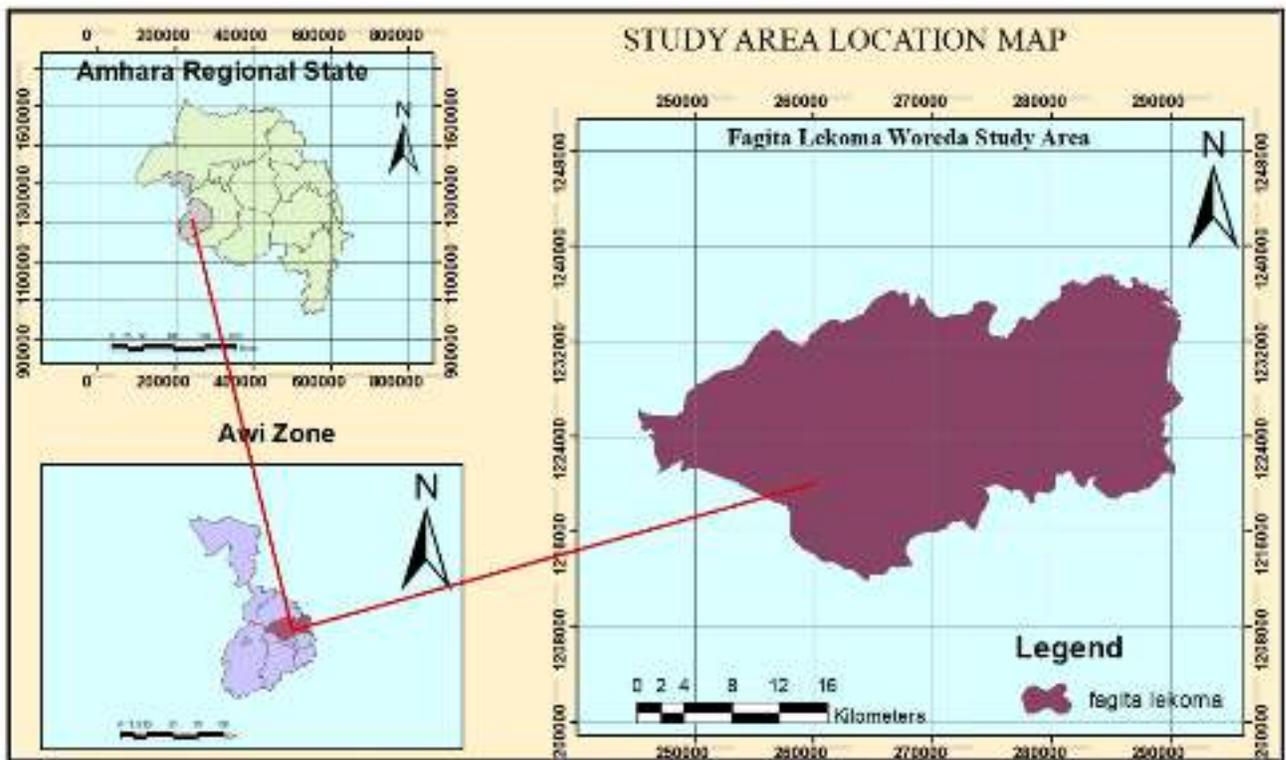


Figure 3.1: map of Amhara, map of Awi zone, map of Fagita Lekoma woreda

3.2 Climate and Topography

According to the metrological information acquired from the National Metrological administrations Agency, the maximum yearly precipitation at study district is approximately

1813mm and its minimum monthly precipitation is 38mm. The maximum most extreme monthly temperature is between 25°-29.90°c while the minimum temperature is 2.6°c. The greatest temperature is happened from February to April and the most minimal temperature is recorded during Decembers and January months (Meteorological organization, 2018). As indicated by the climatologically arrangement, Fagita Lekoma district is almost known as "woynadega" Temperate Rain atmosphere.

The economy of the district is entirely rain-fed agricultural with a subsistence farming system dominated by growing sole annual crops like Teff, Maize, Wheat, and potato. Recently farmers are converting crop land uses to plantation land uses. Charcoal trees like decurrents as a small scall- agro forestry farming mixed with livestock rearing systems. The economy is dominated by small holder subsistence agriculture, which is almost the entire sector depends on rainfall.

3.2 Existing Sources of Drinking Water and basic sanitation in the District

According to the district water desk officers, there is insufficient water both in terms of quality and quantity for almost the community in the district which they can get it at any time they want to. The sources of rural domestic water supply in the study area are rainwater, river, spring, groundwater, surface water, and traditional hand dug well water. On the other hand according to the woreda health extension worker data shows that 75 percent of the community does not have a toilet. Pit latrines according to the research observation are built in the backyard of most households. They are just simply made of digging a hole in the ground down and putting some woods on it and at least a distance away from houses; this was because of their bad odour and they are seldom emptied. They cause too much house flies because of their bad odour. Pit latrines have a small hole on the seat that allows human waste to pass through to the ground. Most of these toilets do not have sit covers and they produce a bad odour through the small hole especially when the weather is hot and when they are full.

3.3 Methodology of the Study

The general methodology of this study uses two techniques descriptive and qualitative methods, which are used to collect the most important primary and secondary data from sampled households (HHs), community elders and school institutions some by using different data collection methods. After the data has been collected analysis will be done by using frequency analysis on table and charts by cross-checking, detail explanations of the methodology of the study.

3.4 Research Design

The research design of the study was used descriptive method and qualitative technique. This research work has focused on the significant impact of poor access to domestic potable water supply and basic sanitation on health, economic, and the environmental situation of the study district. Thus, suggests every HHs, community elders and school member answers and the significant data was collected through observation, questionnaire and interview depends on current potable water supply and basic sanitation situations in the study district and on variables that suggested the arrangements of protected and sufficient water supply and sanitation and furthermore this study strategy would have hoped to gate an appropriate description of poor accessibility of water supply and sanitation in the study area.

Description method: it sets out to describe the significant impact of poor access to domestic potable water supply and basic sanitation on health, economic, and the environmental situation of the study district in and around study kebeles the strategy used with the end goal to represent the conditions of problems and the changing components. It is mainly used to compare and contrast the health, economic, and the environmental behavior of households in the rural kebeles along with their implications on the water access and sanitation status.

Qualitative method: qualitative analysis was involved in distinguishing domestic potable water supply and basic sanitation places, to accumulate household water use practices and to summarize socio-economic information depends on qualitative data, and this data was collected from sampled households and selected some schools from the study district.

3.5 Sampling Size and Sampling Techniques

The researcher selected the community of rural kebeles, in Fagita Lekoma woreda as the area of interest. The area is faced with water and sanitation problems. The target for sampling is only the households. The researcher typically studied samples of the total population in question, rather than studying the entire population because the amount of information that the researcher would need to identify, gather, organize and analyze is to be large to manage. A systematic random selecting system was used to choose the representative sample from a total population of study district and total households of the rural areas. This assessment is better utilizing sample households because considering all population and households of the study district would be impossible. Because the total numbers of people and households are huge enough.

According to administrations of Fagita Lekoma woreda, the total rural populations are 55557. All kebeles of the Woreda are characterized by similar cultural settings and socio-economy conditions. Among those population there will be 150 sampled households, whom that represented the remaining total households of the district. When the sampled measure was determined, the sampled HHs from each closer was chosen by non-probability sampling techniques. The exact non- random selection is the most practical method for sampling is selected deliberately by the researcher. Therefore, the sampled were taken from each rural kebeles considering families, gender and their position, the sampled measure is taken from each sampled group were relative to their quantities of households, which is shown in Table 3.1.

Table 3.1: Division of sampled HHs family units by kebeles

No	Kebeles	Total population	Total HHs	Sample size	Percent
1	Azimach	4932	986	13	8.7
2	Gula	2508	501	7	4.7
3	Gaffera	5180	1036	14	9.3
4	Dimama Manguda	6171	1234	17	11
5	Amesha Shinkuri	7163	1432	19	12.7
6	Gezehera	7968	1593	21	14
7	Washa	3905	781	11	7
8	Ajyasta	4537	907	12	7.3
9	Kuari Gohena	5580	1116	15	10
10	Aykalta	5105	1021	14	9.3
11	Dagi Avola	2508	501	7	4.7
Total		55557	11,111	150	100

Source: Fagita Lekoma rural kebeles, 2013 E.C.

The household Sample size in the study district was established using the Slovene's formula (Ephraim, 2015). As a result it used for water supply and sanitation investigations in the district.

$$n = \frac{z^2 p q}{d^2}$$

Where,

n = sample size, of household

P = proportion in the target population estimate to have a particular character 10%= 0.1

q= 1-p= 1-0.1= 0.9

P= percentage of population picking a choice, expressed as decimal

Z- Values represent the probability that a sample will fall within a certain distribution. The Z-values for confidence levels are 1.645, 1.96 and 2.576 for 90, 95 and 99 percent confidence levels.

d = degree of accuracy desired, set at 0.05 - 0.02 (Chosen 0.04).

$$n = \frac{1.645 * 1.645 * 0.1 * 0.9}{0.04 * 0.04}$$

n=152.214 approximately take sample household size = **150**

According to the table 3.1 above the sample estimate household were 150 as the total.

3.6 Data Collection Methodology

The methodology of data collections of this study were household survey, focus group discussion, key informant interview, personal observation and document review analysis.

3.6.1 Household survey

Both open and closed questionnaires were prepared to collect available data depends on purposes of research. With the end goal to accumulate the proper data about the issues under study, questionnaires were distributed and at the same time interviewed side by side to whom they were selected by systematic sampling and some offices to collect relevant and solid data depend on domestic water supply consumption, adequacy, and availability and the hole about water including sanitation states of the district. The researcher was familiar with the language and culture of the community (Awigna language). So the respondents did not face any difficulties concerning language and unintentional disgracing of culture. First the researcher prepared questioners by English language and all questions were translated into the Amharic and Awigna language which is his mother tongue because almost all the community knows Awigna language and to make it accessible and understandable for sampled households and chosen respondents of the rural community. This was done purposely for simplicity, acceptability, and decrease of duplication of ideas during data collection time. After completion of data collection translate into the English language to analysis and interpretation and also to solve the problems of study.

3.6.2 Focus Group Discussion (FGD)

Focus group discussion was conducted on purposive sampling. The groups were formed on a gender and age basis especially females were more than males in number because they are directly or indirectly influenced.

The researcher conducted three focus group discussions with water committee members, selected women groups and kebele administration officials in the selected sample kebeles. For each group discussions, four to six members had been identified to participate in the eleven selected kebeles. The researcher used different checklists for each Focus Group Discussions.

3.6.3 Key Informant Interview

There are the main responsible actors in the supply of potable water and basic sanitation. The district water desk officers and the community HEWs have a direct contact with the community in providing them with access to potable water and basic sanitation, and creating awareness (Betelhem, 2011). Thus, the researcher has addressed these groups of individuals using personal interviews on what has been done to help the community to get access to potable water and what has been done to reduce the communities vulnerability to water borne diseases and how the poor accessibility is affecting the wellbeing of the community. Then, the interview has been conducted on a one-to-one basis with the HEWs and district water desk officers. In order to have in-depth interviews with these responsible individuals, the interview was conducted by me. These responsible individuals are aware of the issues water and sanitation and they do not have a problem of speaking the national working language of Amharic which the researcher is more acquainted with.

3.6.4 Personal observation

The researcher has used observation as an additional means of data collection which helped to have a general understanding of the area and how the community perceives the environment, to what extent the community is aware of the right to water and sanitation, and how poor access to potable water and inadequate sanitation affects the livelihood of the community. Additionally, the researcher has observed the activities of the community which may reduce their vulnerability to water borne disease and negative impacts of poor sanitation and unsafe

drinking water. To perform this observation, the researcher is familiar with that district and spent time with his family during data collection in the community, which did not have light, water, toilets, telecommunication and internet services. This helped the researcher to understand how it feels to spend all your life without access to these basic infrastructures.

3.6.5 Document review

In addition to the primary data, the researcher has tried to collect written documents from the district, reports and publications on potable water and basic sanitation and published journal and previous research papers which are related to the aims of this study worldwide, in Africa and Ethiopia and to see the rank of Ethiopia, as supporting means of the data collected by the primary sources.

3.7 Method of Data Analysis

After the completion of data gathering, coded, arranged, explained, interpreted correctly and described accurate techniques by using percentage, tables, figures, frequency and rank request were used as methods for data analysis of both descriptive and qualitative methods. Qualitative information was gathered by using various data collection methods through like open and closed-ended questionnaires, interview, field observation and document analysis. This research work has focused on the significant impact of poor access to domestic potable water supply and basic sanitation on health, economic, and the environmental situation of the study site. The data analysis methods of questionnaires were done by using frequency analysis of statistical package for social science model (SPSS-23) program which is used process, analysis and interprets the results of collected data of argument. Then the result of the excel outcomes have been interpreted for the study. SPSS Statistics is a software package used for questionnaires and interactive data, statistical analysis long produced by SPSS Inc., it was acquired by IBM in 2009. The current versions are named IBM SPSS Statistics. The software name originally stood for Statistical Package for the Social Sciences (SPSS). SPSS-23 adds new and advanced statistics and Microsoft Excel was used for computation of the data.

Data interview question analysis was analyzed by using coding data, discovery of themes, organizing and defining the data by the code and interpretation of results.

1. **Coding data:** After the completion of the interviewed data, the information got from the members was broke down and isolated into important parts of and which make up a critical segment of their significant, were named and coded. Next this information was coded and a code list was shaped and it was utilized as a key rundown for analyzing and altering this information.
2. **Discovery of the themes:** the codes established in the stage of encoding were gathered underneath certain groups and themes were recognized. In this study there are total dimensions to determine the existing condition of the district potable water supply and sanitation and its major challenges and also possible solutions for future times in the district.
3. **Organizing and defining the data by the codes and themes:** at this phase, the views of the respondents were described in a language easily understood by the reader and ideas were offered to the reader direct. References were utilized to figure out which talk with notes are claimed by which member and meeting notes were given in quotes.
4. **Interpretation of the results:** the answers explained and introduced in deeply were constructed and give to researcher in proper way. Gathered data were interpreted through the phases needed by qualitative research methods and a number of results were distribution. The questionnaires and interview questions of this thesis are placed under Appendix 1 and Appendix 2 respectively.

CHAPTER 4.0: RESULTS AND DISCUSSIONS

4.1 Backgrounds of the Respondents

In the data collection process, the data were collected on a house-to-house basis and majority of respondents in this district were females. In Ethiopia especially in rural communities, women are targeted as the collectors, managers, guardians of water directly or indirectly. As we can see from the table 4.1 below the age distribution of the respondents is between 18-50 which is 64 percent of the respondents are believed to be the productive age. Among the backgrounds in, the following variables education, household size, household income per month, are believed to be determinants of the water use and demand in the households. It is logical (obvious) that the increase in household size will increase the demand for water. Safe and adequate water supply to rural communities with minimum service level of 20 l/c/d within a distance of 1 km from the water delivery point; Coverage to reach 85 per cent of the rural populations.

Generally, as the household size increases the demand for water increases. Simply comprehend from the collected data, households with 2-5 members need a maximum of 100 liters of water per day; and households with 6-10 members need a maximum of 200 liters of water per day as a per capita of 20 l/p/d. The variation in the liters of water needed per day shows that the household size determines the amount liters of water need per day. The number of household size is directly proportional to water demand. This gives as the size of households' increases, the amount of water needed increases parallel.

Table 4.1: general background of the respondents

Background of respondents		Frequency	Percent	Cumulative %
Gender or se	Male	45	30	30
	Female	105	70	100
	total	150	100	
Age	20-30	22	14.7	14.7
	31-40	38	25	39.7
	41-50	30	20	59.7
	Greater than 51	60	40	100
	total	150	100	
Education	No educate	36	24	24
	Primary	61	40.7	64.7
	Secondary	40	26.7	91.4
	College and above	13	8.7	100
	Total	150	100	
Marital status	Single	28	19	19
	Married	88	59	78
	Divorced	18	12	90
	Widow	16	10	100
	total	150	100	
Household size	2	21	14	14
	3	43	28.7	42.7
	4	36	24	66.7
	5	34	22.7	89.4
	6	13	8.7	98.1
	7	1	0.7	98.8
	8	1	0.7	100
	Total	150	100	
Main occupation	Farming	10	6.7	6.7
	Animal rearing	17	11.3	18
	Mixed farming	17	11.3	29.3
	Farming and daily labor	22	14.7	44
	merchant	40	26.7	70.7
	Government	44	29.3	100
	Total	150	100	

	employee Total			
Household income per month in birr	Less than 300	12	8	8
	301-800	25	16.7	24.7
	801-1200	26	17.3	42
	1201-1700	31	20.7	62.7
	Above 1701	55	36.7	99.4
	I do not know	1	0.7	100
	Total	150	100	

Education is an instrument for socioeconomic development of a nation and a basic parameter for any development activity particularly water supply and sanitation programs. Knowledge and technology transfer are also easier in a community that constitutes educated peoples.

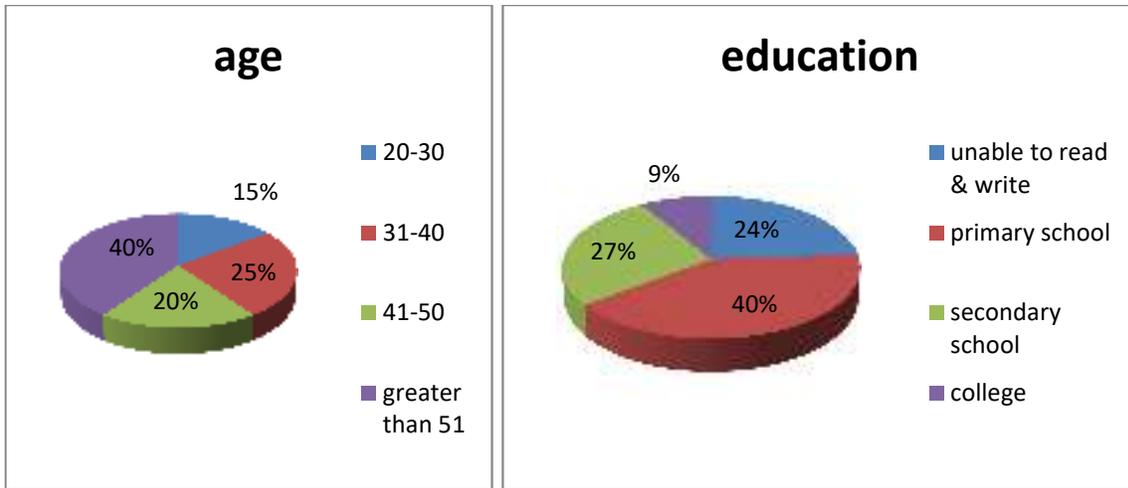
As the researcher understood from table 4.1 above the literacy level in the district is very low that is 24 percent of the households are illiterate (no formal or informal education), some 40.7 percent of them only had the opportunity to attend the primary school but they are forced to drop out from the primary school level. Only 8.7 percent of the population continued further until they graduated from high school.

The reasons why they drop out in school are poverty. Thus, the high poverty level prevents them from attending formal primary or secondary school. But, in general, as the researcher observed during his stay in the community, there are few first cycle primary schools (up to fourth grade) is available in the rural community. After they complete fourth grade they have to walk for hours in order to join the second cycle primary school, which might be another reason for students dropping out from primary school. On the basis of the findings, It was concluded that the illiteracy level in the rural setting the Woreda was 24% which is more than literacy level. This is turn could be one main reason for poor use of rural water supply demand and basic sanitation schemes.

More girls are forced to drop out from school because they are expected to help their parents with household activities and they are forced to marry early enforced by their families. Directly, a few of my respondents told me that they forced their daughters to drop out from school because their mothers have not helped by their sons with household chores including fetching water. These actions forces girls to stop attending school were very common and now

a day's few of them get awareness showing progress in with the help of HEWs. But as we can see from his respondents' response there is no gender equality around the community. Thus, shows that there are still remnants of such backward attitudes in the community which takes girls out of school to help their parents.

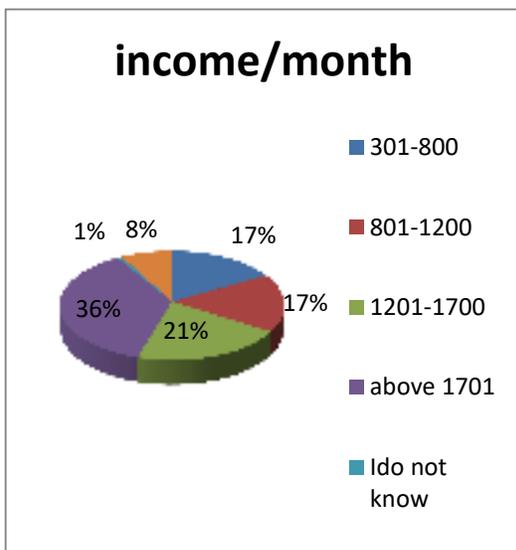
On the basis of the researcher's findings, 6.7 percent of the respondent's (farmer's) source of income is generated from agricultural activities. This agricultural activities use traditional technology like plowing by the help of horses' energy which needs their full time and energy (tiresome). Not only plowing by the help of horses which is traditional, but also they should wait for the rainy season (summer) to sow their seeds. As the researcher observed during his stay in the district, irrigation is not well known in the community. Some 11.3 percent of households are engaged both in farming and trading activities. Many types of crops in summer season produced in the community are well known like teff, wheat, barley, potato etc. The finding shows that 16.7 percent of the respondents earn 301-800 Eth. Birr per month. This household income puts the community members below the poverty line. This amount of money is not enough to feed their family and attending school payments.



a)

Age distribution of sampled HHs

b) education background of sampled HHs



c) Income per month (birr) and source of sampled HHs

Figure 4.1 educational backgrounds, age, income in a sampled HHs

According to the findings on above the table 4.1, 24% of the sampled HHs respondents were explained as unable to read and write. This is not good for the response or explains the past and present situation of the existing water supply in the district. Therefore, education level is one of the major determinants factor that is directly related to water demand and consumption of domestic water supply and basic sanitation of the district. However, few of the sampled HHs was higher education levels then they could not understand the purposes of water for all living things on the land and developments of one country and also, they were to

know public water borne diseases related to the inadequate domestic water supply and improper basic sanitation use in the district.

The findings show that 14.7% of sampled HHs were explained their age 20 to 30 years and 25.3% of sampled HHs were mentioned their age was 31 to 40 year ago, 20% of sampled HHs were explained their ages as 41 to 50 years and 40% of sampled HHs were mentioned their ages as 51 and above years ago living in studied area. The ages of most HHs were above 51 years. The implication gives us most of sampled HHS are understand the significant problems of existing water supply scarcity for district community and they should be answering the around exact answer with related to the past and present inadequate quantity and quality of domestic water supply and basic sanitation in study the district.

According to the finding in the district on the above table 4.1, 90% of sampled HHs told us their family size as 2-5, 10% of sampled HHs were explained their family size as 6-10 members. The numbers of family sizes are increasing required high amounts of daily water demands, and also the high community is required more amounts of daily water consumption for their daily domestic activities. As the numbers of family increases the amount of water demand increases. A family with a number of 2-5 members will need a maximum of water demand 100litres where as a family with 6-10 member needs 200litres of water with principle of per capita demand of 20litres. Generally, the size of family is the major factor of water supply, due this reason consumption of the district water supply depends on family size and economical levels of households, they could be need highest amounts of water consumption per day but their economy level is low and also required less amounts of water consumption depends on their economy levels.

4.2 Water Use and Accessibility

Nearly all populations in the community use water from unprotected water sources for drinking, cooking, washing and other household activities as their main source. Only limited numbers of the community members are lucky to get access to governmental dug well which are treated by chlorine and protected spring water schemes. For the rest population rain water is another source of water for drinking and other household activities. Rainwater runoff from roofs can be collected and stored for drinking and other household activities. Unless the rain

water is affected during collection, it is believed to be of good quality and the only source of contamination is airborne microbes that exist in very small amounts. But the availability of rain water is limited to only mid June up to mid October the rainy season and they should have corrugated-iron sheet roofs to collect it.

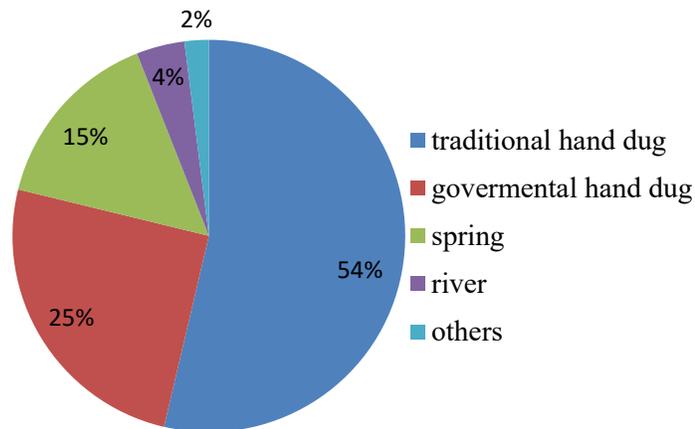


Figure 4.2: Description of water resources uses for drinking purpose

People in the community who are fortunate to get access to rain water are only those who have houses with iron roofs. As the researcher observed few of the houses of the community were made of the local grasses for roof which makes them unable to collect rain water even during the rainy season covers a period of mid-June to mid-October. This gives him rain is available in a short period of time some community did not have corrugated iron house as a result they do not get rain water.

According to the district water desk officers, there is insufficient water both in terms of quality and quantity for almost the community in the district which they can get it at any time they want to. The district water desk officers further explained, in the district there are 167,040 people of whom only 25 percent get access to water which is treated by chlorine. But the rest 75 percent of people get water from unprotected traditional hand dug wells, springs, and rivers. In those studied kebeles there is not sufficient both in terms of quality and quantity at all which is also believed by the district administration. Therefore, respondents of the district agree that there are problems of poor infrastructure like electricity, roads,

telecommunications, health and educational institutions; but above all poor accessibility to potable water is the burning issue which greatly threatens the community well-being.

According to CDC the access to potable water is measured by the percentage of the population having access to and using improved drinking water sources. The sources for improved drinking water are categorized as piped household water connections, public standpipes, deep bore holes, shallow wells, protected dug wells, protected springs and rain water collection. The sources for unimproved drinking water are unprotected dug wells, unprotected springs, surface water, and vendor provided water. Therefore, as we can see from the above classification more than half that is 75 percent the rural kebeles water sources are unimproved except for rain water collection which depends on some conditions like the seasonality of rain and unavailability of iron roofs. Few houses in the community have roofs made of local grasses which prevent them from collecting the rain water easily while keeping its quality. In addition, the rainy season is from mid-June to mid-Sep. which means it is limited to only three months.



Photo 4.1: a river and a spring drinking water sources around schools

4.2.1 Distance from the water resource

Some lucky members of the community obtain their drinking water from hand dug wells and springs which are protected and improved sources. But they should also walk for more than half an hour to collect water from these protected and improved sources. The number of visits to the water sources depends on the amount of water they require per day. The average distance travelled for fetching from the source to home has been estimated in terms of respondents. During the data collection time the researcher observed, 95 % of the people in the community need a minimum of 50 L and a maximum of 125 L of water per day. In order to fetch this much water, people have to go to the water source at least twice a day. It takes a minimum of 10-25 min for those nearby to the water sources to fetch water. However, more than 60 % of the community has to walk for more than 25 min to fetch water from the unprotected traditional sources. This much time is just for one trip but as many in the community want to have 50 or more liters of water per day this obliges them to walk for almost an hour.

Out of the total respondents, the minority 4.6% reported that the current water source is located at an estimated distance of less than 500 meters in sampled kebele. The next great proportion of respondents 26% accounts for those who travel an approximate a distance of 501-1000 meters. The next proportion of 16% responded that they travel a distance at ranges in a proximate of 1001-1500 meters. The next lease proportion of respondents 44.7% accounts for those who travel an approximate a distance of 1501-2000 meters. The rest and the majority respondents 8.7% responded that they travel a distance at ranges in a proximate of more than 2 km Regarding the average time taken a duple trip to fetch water from the current water source the statistical finding of the survey shows that 8.7% of the total respondents spend on an average approximately 2 h and more.

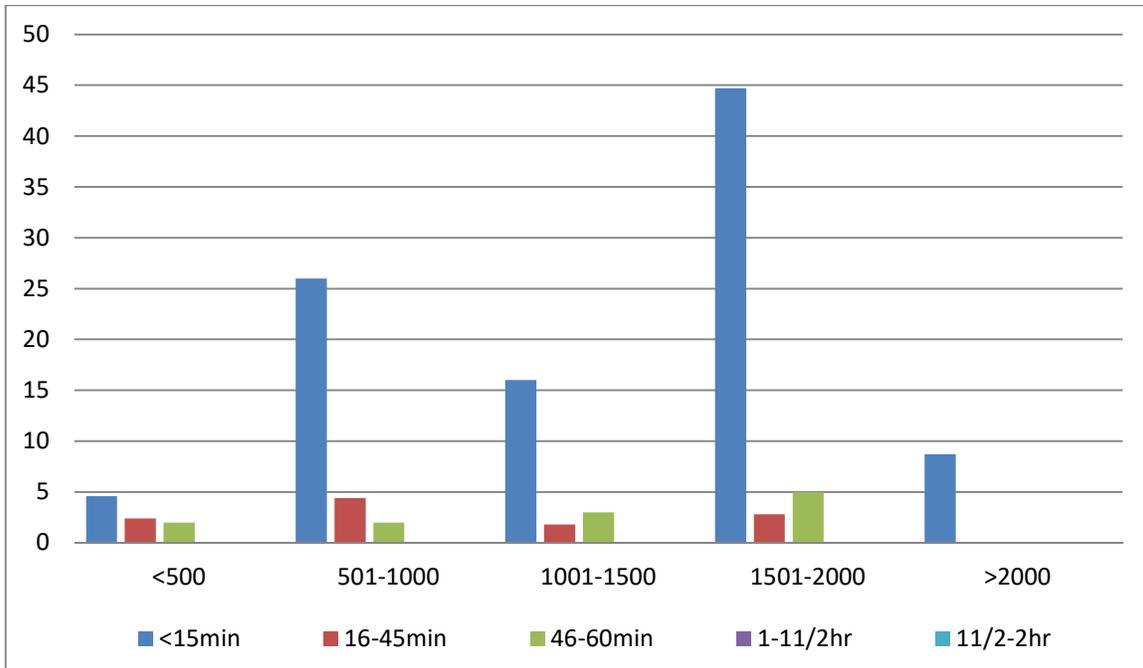


Figure4.3 Distance (m) and time it took to fetch water

People have to carry 20-25 liters of water by jericán on their backs from the source to their houses which takes almost one hour to collect the minimum of 50 liters per day. As a result, all the household members have to visit the water sources as many times as possible to satisfy their water needs. On the other hand, the distance from the source determines the amount of water they can collect.

If the water source is near, people can watch the water source to satisfy their water demand whereas it is far they cannot satisfy their water demands. The responsibility of collecting water in the community is drop out at the back of women. When the researcher collected the data 98 percent of people who collect water for household activities are females and the rest 2 percent were males. When we see water collecting responsibility in terms of age, 60 percent of those who are responsible to collect water are under the age of 15 years. In terms of age they are not capable of carrying such amounts of water, alongside which they are expected to be absent from school to help their parents fetching water. The case has a worst consequence in the households which parents are not able to fetch water by themselves; they force their children to drop out from school. Some of his respondents told me that their daughter quit

school because they do not have someone else who can help them fetch water and other household activities.

Women's contribution to household activities is not only limited to collecting water but it also includes preparing food, cleaning the living room, taking care of children, helping their husbands in farming and many more household activities are on women's shoulder. In addition to all the burdens at home, they have to walk for hours to fetch water to satisfy their family members' water demands. In general, women do not have any time to maintain their own hygiene.

4.2.2 Quality of water

Quality of water is free from human poisoned substances like in chemically, physically and sometimes radiological. Quality of the water source was based on the perception of the households during the survey and the laboratory results obtained by the quality tested from selected water sources. Water quality analysis was used to present the household perception of water quality in rural areas and following the results of the laboratory tests as compared with the WHO standards. For the analysis of water quality the main water quality indicator parameters were detected from the laboratory including physical, chemical and bacteriological quality. Even though scientific measurements are used to define water quality, in this study it is difficult to inspect the chemical and biological purity of the water used by rural community, of course it doesn't have an objective to the title of his thesis. In the study district, the physical lack of purity of the water is beyond argument (obvious). The researcher believed that the community's perception towards the water quality determines the way they treat the water they get from these sources.

According to MOH the HEP is designed to improve the health status of families, with their full participation, using local technologies and the community's skill and wisdom. The philosophy of HEP is that if the right knowledge and skill is transferred to households they can take responsibility for producing and maintaining their own health. To perform the HEP, HEWs are assigned to each rural farmer groups where one of their responsibilities is to teach the community about hygiene and environmental sanitation in which water supply and excreta disposal are included. HEWs in the community whose jobs are teaching the community about health and hygiene is employed by the government.

The responsibility of creating awareness among the public concerning health and hygiene related issues is given to HEWs. They try to exploit every opportunity to create awareness concerning all health related and hygiene issues. In most cases they arrange meetings with the community, social gatherings like 'Idir', and religious celebrations days to teach the community members. So creating awareness concerning water treatment and sanitation is on the shoulders of these female HEWs, who walk for hours on a home-to-home basis which makes the job tiresome and ineffective.

One of the teachings of these HEWs give to the community is water treatment, in order to create awareness concerning the side effects of drinking unsafe water. In order to make the water which the community members collected from the traditional ponds safer to drink, HEWs provide them with tablets, chlorine and teach them other means of treating water like boiling and straining it through cloth. But many of the community members are reluctant to apply what they learn. The HEWs listed some reasons for the fact that community members do not have time to apply everything they learnt from the training since females are responsible for all the household activities, in addition to collecting water. They are unwilling and they do not have a positive attitude towards the tablets given to them and as a result they fail to apply the tablets to the water they drink. The other reason is even if some of the community members want to apply the tablets the district administration does not provide them with sufficient quantities of tablets which is satisfactory to all community. Thus, the easy and only option to treat water is boiling the water but many complain that they do not have time to boil the water since they have lots of other responsibilities at home.

4.3 Toilet Use and Accessibility

Sanitation is a basic all human being needs of safe disposal of human excreta. And People have the right to water and access to basic sanitation. In the rural district particularly in the sample site, the Figure explains the current sanitation status.

The data collected from the sample respondents shows that 75 percent of the community does not have a toilet. Pit latrines according to the research finding are built in the backyard of most households. They are just simply made of digging a hole in the ground down and putting some woods on it and at least a distance away from houses; this was because of their bad

odour and they are seldom emptied. They cause too much house flies because of their bad odour. Pit latrines have a small hole on the seat that allows human waste to pass through to the ground. Most of these toilets do not have sit covers and they produce a bad odour through the small hole especially when the weather is hot and when they are full.

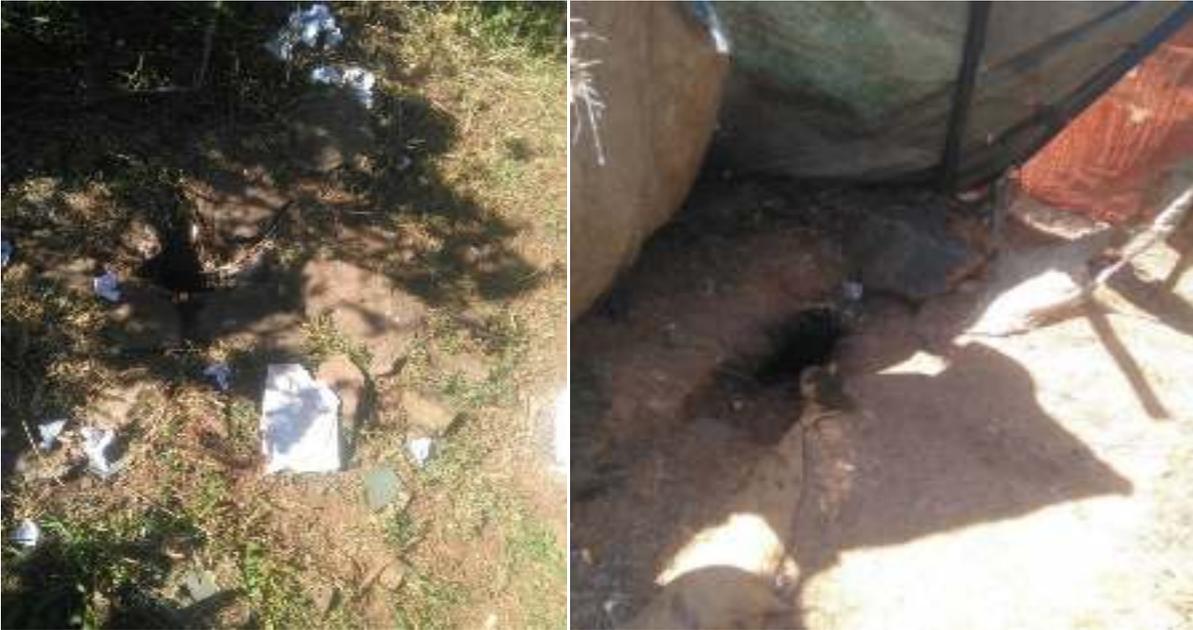


Photo 4.2: rural community’s sample toilet

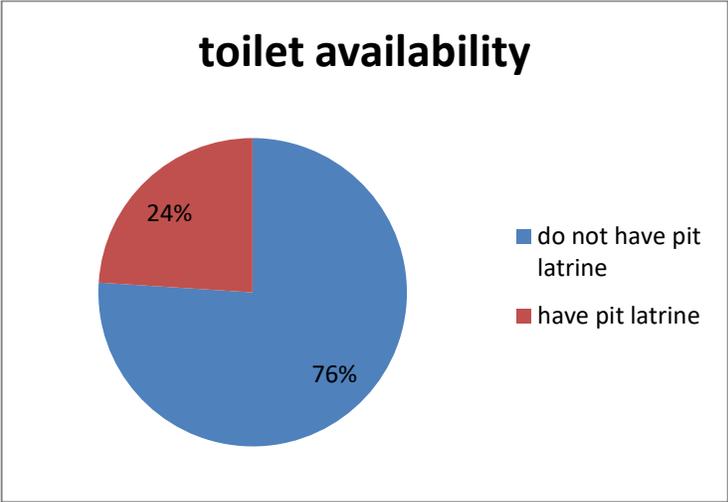


Figure 4.4 toilet availability of the district

Those who do not have toilet which means 76 percent of the community defecate in an open air field, near river, and in a place where far from their house. Though still adults may

defecate in an open air field which is far from their house or near rivers, it does not work for women and children. As the researcher observed women and children are not expected to go far or to use toilet to defecate, rather they are expected to defecate in a place near to their houses and may be in a place where they play. The reason children defecate in a place where near to the living houses is not only limited to those who do not have toilets but it also works for those with toilets. On the other hand 24 percent of the communities have pit latrines to deficit. Since the toilets are simply made of local materials without any facilities, it is not safe for children to use it.

As it is applied to water sources, people in the community can be classified either people with access to improved sanitation or people with unimproved sanitation. Improved sanitation includes connection to a public sewer, connection to septic systems, pour-flush latrines, simple pit latrines and ventilated improved pit latrines. Not considered as improved sanitation are service or bucket latrines (where excreta is manually removed), public latrines and open latrines. Therefore as we have seen from the collected data of the rural community, they do not have access to improved sanitation. People do not have access to toilets and even those who have access to toilets the toilets do not have any facilities. As we have seen in the literature review, the approach to sanitation in the sample study site relies on ‘do nothing’ and ‘drop and store’ approach. That means 55 percent of the community uses the ‘Do Nothing’ approach and the rest 45 percent uses ‘Drop and Store’ approach.

4.4 Impacts of Poor Access to Water Supply and Basic Sanitation

The poor accessibility to potable water and basic sanitation has many negative impacts on the community daily activities (Betelhem, 2011). Though the negative impacts of poor accessibility to potable water and basic sanitation is not debatable, the degree of understanding the negative consequences attached to it may vary from person to person. In this study, many agreed with the negative consequences of the poor accessibility to potable water and basic sanitation on economical, environmental and health impacts are some which were identified by the community members of the sample study site. As we can easily notice the social impacts may have some relationship with the environmental, health and economic impacts and the reverse will also be true.

4.4.1 Social impacts

Increases conflict over water resources

At the time data collection, the researcher got an opportunity to observe how people respond to the water resource projects; water desk officer who came to the study site to drill for groundwater. In this case the researcher had the possibility to see the conflict between villagers concerning where the drilling for the groundwater is to take place. The conflict is not only limited to the villages but also between people in the district are also involved in conflicts to access water resources. The conflict arose when one person acquired drilling services for ground- water and constructed a well that the other person felt like they were ignored and rejected by the government. And sometimes they prevented the trucks with the drilling equipment to pass by their villages unless they also drilled their land to locate groundwater. This conflict seems to demonstrate a lack of awareness concerning drilling for groundwater resources, which they think they can easily access by drilling and without any feasibility studies. Such conflicts arise because of competition over scarce water sources. On the top of that it shows how eager the community members are to get easy access to potable water. As the district water desk officer explained, such conflicts are happening very often which shows that the need for potable water is increasing rapidly. There may be many reasons for such a scarcity of potable water in the district, which we will see in the coming topics.

People do not have privacy to relieve themselves

Government or non-government organizations encourage people to build their own toilets for a multitude of reasons, beyond keeping the environment clean and ensuring a healthy environment, people will also wish to have privacy when they relieve themselves. As we have seen in the above topics, the sanitation coverage in the community is very low. Thus, many of the community members defecate in an open field or in a place far from their dwelling houses. As a result, people are not free to defecate where they want to during the day because there is no privacy to defecate in such places. The situation is much worse for women because of lack of privacy and they have to wait until sunset to relieve them. And of course there is no privacy in defecating in an open field. This obliges the community members, especially adults, to wait until sunset.

Health impacts

The poor access to potable water and basic sanitation greatly affects the well-being of the community. It is known that the health impacts of poor sanitation and poor quality water have health impacts on the community especially to women and children. The health effects of unsafe drinking water and poor sanitation are not limited to illness; some have even died because of diseases related to water and poor sanitation.

The community members are greatly exposed to water related diseases. Most of the respondents are aware that their inability to access potable water is a source of their poor health. Diseases related to unsafe water and poor sanitation are common in the community. Diarrheal diseases and diseases like trachoma, typhoid, and scabies are affecting the members of the community. Trachoma is a preventable eye disease but can be a cause of blindness which is spread by flies that breeds in an unclean and dry environment. Some diseases are also life threatening because of water and sanitation problems. As we saw in the general background of the respondents, the monthly income of many is insufficient for them to access a clinic if they become sick. As a result, some members of the community are forced to suffer at home with easily treatable and preventable diseases. The health of the community is greatly threatened because they do not have access to a hospital or clinic nearby. In order to reach to the 'closest' clinic, they have to walk for hours. Because of the non availability of a clinic and no road construction, people are forced to use horses or by carrying to transport sick people to the clinic.

According to HEWs stated many of the community members are repeatedly affected by water borne and water related diseases like amoeba, typhoid typhus, diarrhea and the like. Even, sanitation related diseases like trachoma is one of the preventable diseases which impact the community greatly, including children. Parasitic and infectious diseases are among the top killer diseases of the community because people do not have access to potable water and basic sanitation, and less accessibility to clinic at the nearby.

In general we can say that the combination of unsafe drinking water and improper sanitation leads to a deterioration in the human resources of the district and the country at large.

4.4.2 Economic impacts

There are some economic impacts which were stated by the community in the study district. Some of them are directly related to their health status and others are related to the time spent in collecting water and their choice not to drink water from the unprotected sources.

Reduce productivity due to absenteeism

Community members' health status is affected by water related or water born disease. As a result, those community members are forced to be absent from their work, for they are unable to work because of the illness. This reduces the household's income for almost all the community households which depend on agriculture. When one of the household members becomes sick, the others have to invest some money to make him/ her healthy. And if the patient is the household head, the income of that household is highly negatively affected. Children are greatly exposed to unsafe water and poor sanitation related disease since they spend their time playing in a place where they defecate on. Parents have to take their children to a health station if they get sick. As a result, parents have to be absent from their jobs and invests their money for medicinal cases, which lessens productivity.

Increasing medical expenses

According to the household income of the community, 89 percent of the households have a monthly income which is less than 800 Br. Within this low income they are expected to pay for their own treatment and that of their children when they get sick. Thus, high medication costs are one of the economic costs which the community regards as a great burden.

Impact on the household income

It is obviously understood that the economy of a country is negatively affected by the poor accessibility to potable water and basic sanitation. But how many of the community members in district realize that unsafe drinking water and unimproved sanitation has a negative impact on their household incomes.

There are people who believe that the poor accessibility of potable water supply and basic sanitation has an impact on their household income. This group accounts 85 percent of the

respondents while the rest believe poor accessibility to potable water and basic sanitation does not have any impact on their household income. Those who believe as it has impact identify how the poor accessibility of potable water and lack of basic sanitation affects their livelihood. If they do not get potable water then they get sick, thus they are not productive at work which will decrease their income. These people are relating water related diseases not directly to the quality of water or the access to basic sanitation, rather they relate it to adapting to it or not. That means when a stranger comes to the community and drinks the same water, he/she may get sick because he/she is unaccustomed to it.

4.4.3 Environmental impacts

The FDRE constitution of article 44 sub-article 1 stated that ‘All persons have the right to a clean and healthy environment, ’ despite what is stated in the constitution many people in rural Ethiopia do not have a healthy environment. There are still significant numbers of people who do not have access to a toilet to defecate in a proper place. Since 75 percent of the community do not have toilet, they defecate in an open field, near a river or in a place far from their houses while children are not obliged to go far to defecate, rather for their safety they are encouraged to defecate in a place near their houses or in a field where they play. Consequently, the environment is not clean and is uncomfortable to live in. Thus, flies transmitting insects can easily breed and cover the area. As the researcher observed, children play in a place where they defecate while their faces are covered by flies.

Apart from the environmental, economic and health impacts which the water accessibility and sanitation level has on the everyday activities of the community, this issue also affects their human dignity. So when people have a natural call, they cannot defecate whenever they want to, rather they have to wait until other people leave the place or if they are female they should wait until sunset. In addition, because there are no separate ponds in the community, people are forced to use the same source of water as their animals. On top of that, during the dry season the sources of water which are nearby might dry out and people have to go far to collect water which is a big challenge to the community.

Though most of the respondents agreed that the poor accessibility of potable water and basic sanitation has impacts, there were very few respondents who argued that poor accessibility of

water and sanitation does not have a negative impact on their daily lives. Thus, this attitude towards the current water and sanitation status helps them to easily adapt and accept the situation by drinking water from unprotected sources and defecating in an open field. Some others think though they are facing the problem of water and sanitation, they argue that they already adapt it and learn how to live with it. Thus, they believe the poor access to water and sanitation is not considered as a big challenge which the community currently faces. Therefore, there are three groups of people based on their perception towards the impact of poor water accessibility and sanitation:

- People who know and understand the negative consequence of the poor quality of water
- People who know the negative consequences of the poor quality water but adopt themselves to it and are fine with it
- People who do not understand the negative consequences of the poor quality of water and believe it does not have any negative impacts on their livelihoods. People who belong to the third group may never have been convinced of the desirability of new water sources or new excreta disposal facilities.

4.5 Factors Hindering Access to Domestic Potable Water

Access to water supply is fundamental human rights. However, rural water supply is constrained by multiple factors related to socio-economic (community and financial), technical including (operation and maintenances), institutional, environmental factors. The effects of development activities like water supply programs particularly in rural areas of developing countries like Ethiopia may not reach the intended beneficiaries overnight for many reasons. Some reports from Ethiopia, and other developing countries showed that insufficient and inappropriate technology accounts for the failures of some of the water schemes and, along with insufficient water sources and poor physical structures. Fagita Lekoma Woreda Water resources development office pointed out those the main problems of rural water supply schemes are multidimensional. They under lined the main problems as; “Weak coordination between different services delivery this is due to the current political crises of the country, weak capacity of the woreda in financial, in appropriate use of the existing schemes by the water committees, inappropriate technology, the water committees are

weak and unable to operate the schemes. In this Woreda water resources development offices are not equipped with adequate transportation equipment tool, lack of spare part and official to provide and human resources the needed services and access majority of the population of rural area are very difficult due to weak infrastructure development like road and geography of the Woreda.

When respondents were asked why they do not have get access to potable water and basic sanitation, they forwarded the following reasons. Some of the factors given do not have any scientific grounds which may not be sound reasons in professionals' point of view.

4.5.1 Ground water resource availability

It is known that ground water resources are a source for many hand dug wells in Ethiopia. The community members believe that one of the reasons which do not enable them to have access to potable water is unavailability of ground water resources. Often professional workers come from the district administration to drill for ground water but such efforts have failed many times. The district water desk officer said, these kinds of projects failed because they did not have accurate pre-feasibility studies. Thus, this lack of studies does not indicate whether the district has ground water resources or not.

The Encyclopedia of Earth (2008) stated that the groundwater potential of Ethiopia is not known with any certainty, but so far only a small fraction of the groundwater has been developed and this is mainly for local water supply purposes and traditional wells are widely used by nomads. When we see what the experts said in this regard, we do not have any accurate basis to say the district is running out of ground water resources.

4.5.2 Geographical location of the community

The geographical location of the community was identified as a reason for not having potable water and basic sanitation infrastructure as the neighboring community has the advantage of having infrastructure like roads, electricity and to some extent water.

4.5.3 Failure in community participation

The district and community authorities do not involve the community in the development activities of the area. This was one hindering factor for not having potable water and basic sanitation in the community. Community participation has been a key factor for rural water supply and sanitation provision. Failure to involve the community in development activities has been a very significant factor in not having access to potable water and basic sanitation.

The community and the government failed in working together. Then people in the community perceive that they do not have any role in the development of overall infrastructure in the district. This makes them wait for what the government can bring to them. So participation of the community in any kind of development activities in the district is very low.

4.5.4 The communities do not exploit the opportunities

The current situation of the country encourages people to participate and invest in their birth places which in turn help the community to get access to much infrastructure. The community dwellers believe that there are some people who were born in the rural areas who eventually became rich Diasporas. But the community failed to involve these rich people to invest and help their birth place in overall infrastructure development. While the respondents think this was the responsibility of the district administration office, both failed to do so.

4.5.5 Infrastructure unavailability

The infrastructure problems are given as another factor which prohibits the access to potable water. The community has a poor infrastructure, especially roads and electricity, that people are not attracted to invest their money in the development of the area. In addition, some believe that private businesses, Diasporas and NGO's which work in development activities are not capable of penetrating most rural areas because of poor infrastructure though the reality should be the opposite. It is opposes that private businesses do not move into rural areas if they are not going to make profits and if the place is not technology friendly to adopt their business, private business people will not be willing to start a business in that area. Rural areas are very isolated and have inadequate infrastructure like roads, health, education and

potable water and sanitation services, which is a challenge to government and private organizations to provide such services to rural communities.

4.5.6 Shortage of budget

According to the district water desk officers, there is always a budget shortage to do what is planned to each community especially with water and sanitation at the beginning of the year. Though the district has a plan for digging at least one hand dug well in each village, these plans cannot be realized because it does not have a sufficient budget to implement it.

CHAPTER 5.0: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The researcher looked that the coverage of rural water supply schemes in the woreda were less due to different reasons. The majority of respondents in the study area use unprotected water sources for domestic purposes. The researcher uses the data from rural kebeles in Fagita Lekoma district under the supervision of relief of society for the period of 2013 EC to identify development impacts of poor accessibility of domestic water supply and basic sanitation on household's level. There is a deficiency of improved potable water and access in the community in quality and quantity. To overcome this problem the community use traditional unprotected hand dug well, spring, river, rain and protected hand dug well are the sources of water for those kebeles in Fagita Lekoma. The water they get from the above listed sources is used for both drinking and other household activities. In terms of coverage the traditional hand dug well amount for the highest coverage for both drinking and for other household activities in the community which is more than 75 % of the community gets their drinking water from the unprotected water resources. The responsibility for collecting water from these sources is almost all on the shoulders of women while their frequency of visits to the water sources depends on the amount of water they need per day and number of family sizes. As we have seen from the analysis, every woman has to visit the water source, which takes 26.3 min on average for one trip, at least twice a day. The worst case for the responsibility of fetching water is children whose ages are less than 15 at the age they supposed to be at school. Most of the respondents in the district agreed that the purity of these from listed above water sources of the drinking water is not enough to be called good quality. Though most of them agreed on the poor quality of water, very few of them treated their drinking water, for which lack of awareness, being reluctant and unable to get water treatment tablets are some of the reasons they given. It is obvious that the safe disposal of excreta is a means to ensure a healthy environment to live in. But as the study shows, only less than half of the population of the district has access to simple pit latrines. These latrines are made of the local materials which do not include any facilities. The rest means more than half of the populations, use open fields to relieve themselves.

Health, economic and environmental impacts which are related to poor accessibility to domestic water and basic sanitation were the main points of the thesis. Under economic impacts productivity losses due to absenteeism and high medication costs (wages) are the highest; health problems like diarrheal diseases, typhoid, and trachoma are common in the district. Environmental consequences cannot be overlooked with children's faces covered with flies because of the unclean environment and an irritating smell around and being sources of water born disease. The members of the district also identified the unavailability of ground water resources, geographical location of the peasant association, community participation, other infrastructure problems and lack of awareness are some points listed under reasons for poor accessibility to domestic potable water supply and basic sanitation in rural areas. The recommendations from the key informants are what can be implemented in the short run and in the long run.

5.2 Recommendations

Based on the empirical findings and analysis discussed in the previous chapter, the following recommendations are given: Water, sanitation and hygiene education programmed should be given in the district place. As we have seen in the empirical finding and analysis, HEWs in the community are not enough to train all the households concerning water and sanitation education. To be effective in training of the population, the number of HEWs has to be increased. Besides increasing the number of HEWs, the education given to the community should focus on attitudinal changes towards water treatment using tablets and to build their own toilets, and there should also be a focus on creating awareness concerning consequences of using poor quality water and unimproved sanitation systems. As we have discussed in the previous chapter some people in the community do not have positive attitudes towards the tablets provided for the treatment of water and building latrines. Thus, the awareness creating campaign and training would have a significant role in shaping the community's mindset.

The reasons for the poor supply of potable water and sanitation discussed in the empirical findings and analysis are taken as an excuse for accepting the current water supply and sanitation situation of the society, which the population and the district administration should give due consideration. One of which is community participation, the district administration should work with the community and they should let them to participate in every development

activity of the district. The district administration and the woreda as well should use the experience of community mobilization from other woreda in order to enhance the community's role in development of their local place.

The measures to be taken can be classified as long run and short run measures. In the long run the communities and district administration should work on expanding the water scheme projects to the rural parts of the district and encourage NGOs to work in the development sectors of the district. In the short run people in the district have to be secure from the negative consequences of the poor access to domestic potable water and basic sanitation through awareness-creating campaigns in order to minimize the community's exposure to preventable but easily communicable water borne, water related and poor sanitation related diseases. The responsible bodies at community and district level should consider that every dweller of the community has the right to have access to domestic potable water and basic sanitation. Thus, the responsible authorities should strive to the best of their ability. In addition, it is the constitutional right of all Ethiopians to live in a healthy environment, thus there should be no excuses for the rural people to suffer from the negative consequences of an unhealthy environment. Therefore, it is the responsibility of the communities and the district administration to teach the society to take care of their environment and to supply them with potable water.

5.2.1 Investing in community water infrastructure

The government should construct more water infrastructure schemes that will supply the whole community with domestic water; these include installing extra boreholes, improving water wells, taps and spring developments. The more water sources will reduce the burden of having to walk long distances to fetch water.

5.2.2 Community's participation

Public participation action is needed to remedy domestic water and sanitation problems, but it must be action based on clear policy which is premised on the rights of all people to determine their own future. The villagers should be in the forefront in all phases of the water projects in the village. The villagers should be given the opportunity to identify, implement, monitor and evaluate community water projects. The community should also be given the opportunity to

select the appropriated water technologies they want and the location of water sources. The villagers should be given the opportunity to participate in community meetings, water projects and income generating project such as planting vegetables. Community members should have the customers care helpline numbers in order to know who to contact when water is cut off. Women should also participate in water projects. Women's' knowledge and experience of water management should therefore be acknowledged as a worldwide resource to be developed, encouraged and used. A platform must be created that will encourage villagers to voice their opinion and share their knowledge. Information is a fundamental aspect of any development.

5.2.3 Protecting drinking water sources

Open water sources should be protected from the debris falling into water wells to reduce health hazards. There is a need to enhance environmental protection around wells in regions not reached by water pipe networks. There should be awareness programmes in the community that educate people about protecting water sources. Community awareness programmes should teach the villagers about the dangers of contaminated water, and should encourage training on how to protect drinking water sources. Villagers should be involved in nature conservation activities; these include protecting natural water sources that exist in the community, such as springs.

5.2.4 Improving village's sanitation coverage

Overcoming the obstacles to improving sanitation will require policies and funding initiatives. With enough funds the government would be able to construct improved pit latrines with air ventilation systems for poor households. Improving village sanitation coverage means providing sanitation for all. Water should be accessed every day by the villagers since improved sanitation requires water for proper functioning and this will improve village sanitation coverage. Lack of water poses public health risk that can lead to increased mortality if there is no intervention.

5.2.5 Sustainable financing strategy

A sustainable financing strategy is needed. A good financing strategy will increase resource allocations to water and sanitation sectors. It will improve the efficiency and effectiveness of existing resources wherever they are found, and tap the potential of alternative financing mechanisms. Efforts directed to the government to increase government allocation and to facilitate the investments being made for communities are needed.

5.2.6 Providing safe water and sanitation on community basis

- 1) Avoid contamination of water in distribution systems
- 2) Applying technologies of growing water scarcity and the potential for water reuse and conservation
- 3) Implementing innovative low-cost sanitation systems
- 4) Providing sustainable water supplies to the communities
- 5) More organized participation of households
- 6) Integration among sectors
- 7) Integrate sanitation and hygiene with water supply provision
- 8) Sanitation for all
- 9) Strengthening community participation
- 10) Regular assessment of water supply sources and storage
- 11) Improving latrine and hygienic facilities user than coverage
- 12) Establish committee with full participation of community
- 13) Increasing Income of Households
- 14) Inclusion of women on training

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Appendices

Annex A: Household questionnaires

My name is Gizachew Kassahun from Bahir Dar University, I am taking household surveys which are being conducted for the purpose of pursuing Masters Degree on Water Supply and Sanitary Engineering study completion on the topic of “water supply and sanitation of Fagita Lekoma woreda rural kebele, Awi zone, Ethiopia” your information is very important for the study. So, I kindly request you to provide me with your answers. The information you give will be used only for academic purpose. I hope that you will answer these questions as honest and complete as possible. Thank you for your help in advance.

Part1: Household Interview Questionnaires

1. Name of interviewer _____
2. Date of interview _____
3. Name of kebele and Village. _____
4. Sex of respondents; Male-----Female-----
5. Age of respondents-----
6. Number of household members-----
7. Educational level of respondents

Educational level	tick
Primary	
Secondary	
College	
No formal education	
others	

8. What is the average income of the respondents per month?

Income per month in birr	tick
Below 300	
300-800	
801-1200	
1201-1700	
Above 1701	

9. What is the respondent's major occupation?

Major Occupation type	Tick
Farming	
Animal rearing only	
Mixed farming	
Farming and daily labor	
merchant	
Government employee	

10. What are the main sources of income to sustain the livelihood of the family?

Sources of income	Tick
Agriculture	
Trade	
Business and private job	
Others	

Part two: current water supply source and accessibility

11. What is the main source of domestic water supply in the community?

Water supply sources	tick
Spring water	
Rain water collection	
Traditional hand dug well	
River	
Hand dug well	
Piped water	
Shall well	
Deep well	
others	

12. Who occasionally goes to the source to fetch the domestic water for the household?

a). Is this person under age 15 years? Yes----- no-----

b). what sex? Male-----female-----

13. How long does it take to go, get and comeback to the water source?

Time taken	tick
Below 15min	
16-45min	
46min-1hr	
1hr-1 1/2hr	
More than 2hr	

14. How far is the water source from your household?

Distance	tick
500mts or less	
501-1000m	
1001-1500m	
1501-2000m	
2km and above	

15. How many times you often go to fetch water?

Number of journey	tick
Once	
Twice	
Three times	
More than three times	

16. Do you treat your water in any mechanism to make it safer to drink? A). yes b). No

17. How much amount of water do you use per day by a 20litre jerikan? -----

18. How long it take to fetch it? -----

Part three: basic sanitation use and accessibility

19. Do you have a toilet? a) yes ---- b) No-----

20. If your answer for Q.19. 'Yes', what type of toilet facility do members of your household usually use?

Toilet facility	Tick
Pipe sewer system	
Pit latrine	
Open defecation	
No facility	
bucket	

21. Do you share this toilet facility with other households? a) Yes---- b). No----

22. How many households use this toilet? ----

Part 4: Impact of water and sanitation accessibility

23. Would you explain the impacts attributed by the poor accessibility of sanitation to your household?

A. Economic impacts

B. Health Impacts

C. Environmental impacts

E. Others

Annex B: Questions for Group Discussion

1. What are the basic problems in the community?
2. Do you think these problems are negative impact on the community members' economic welfare?
3. Do you think the current water and sanitation facilities situations are satisfactory to the community members?

4. What initiatives does the community take to increase the availability of safe drinking water and sanitation?
5. What are the priority infrastructures in the community?
6. What is your opinion in the relationship of infrastructure and economic development?

Checklist for Key informant interviews (KII)

Dear interviewee, this interview is meant to assess the “water supply and sanitation” as a case study of Fagita Lekoma Woreda and to identifying the major determinants of poor accessibility of water supply and improper sanitation in rural areas and thereby make invaluable contribution towards the future development of the community. To that effect, I would like to assure you that all information gathered will be used solely for the study purposes only and the identity of the community members, who share their view, or that of any individual within the community and organization will not be revealed

Annex C: Interview Questions for HEWs in the Community

1. Background: age, sex, educational level, etc.
2. Year of your service in the current kebeles and other places
3. Major activities of health extension worker
4. What are the basic problems in this community?
5. Are the diseases are related to unsafe drinking water and poor sanitation?
6. What role do you play to minimize the exposition of the community members to water borne diseases?
7. Do you think unsafe drinking water and poor sanitation have negative impact on the economic welfare of the community members? If ‘yes’ in what way?
8. Do you believe that the trainings you have had allows you to address most problems of the community?

Annex D: Interview with the District water Desk Officers

1. What are the basic problems in the community related to water sources and use?
2. Is there sufficient water for all community members at any time?
3. Is the water quality sufficient for drinking?
4. Is the water supply system technically sound and feasible for the needs in the community?

5. Do you think there is a linkage between poor accessibility of water supply and sanitation and the economic welfare of the community?
6. What initiatives does the community take to increase the availability of safe drinking water and sanitation?
7. What are the priority infrastructures in the community?
8. Do you contribute to create awareness about using safe water?
9. Are there NGOs working on water development activities?
10. What do you think are the main constraints to improve water supply and sanitation?
11. Are there competition and conflicts over water by the kebeles inhabitants?
12. Have you recognized any problems caused by unsafe water consumption?
13. Do the government and NGOs attempt to promote public participation in water related development activities, and in what ways?
14. What are the major problems in relation to water supply?