

WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCE AND HUMANITIES

DEPARTMENT OF GEOGRAPHYAND ENVIRONMENTAL STUDIES

ASSESSING THE CHALLENGES OF DOMESTIC WATER SUPPLY: THE CASE OF MERSA TOWN, HABRU WOREDA, NORTH WOLLO ZONE, AMHARA REGION

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A SENIOR ESSAY SUBMITTED TO DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES, FOR PARTIAL FULFILLMENT OF THE REQUIREMENT OF BACHELAR OF ART DEGREE IN GEOGRAPHY AND ENVIRONTAL STUDIES

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Declaration

Tewodros Temesgen and Tilahun Markos do here declare to Wolkite University Department of Geography and Environmental Studies the senior essay entitled "assessing the challenges of domestic water supply:-in case of mersa town, habru woreda, north wollo zone, amhara region during the 2024 for the requirements of bachelor degree of art in Geography and Environmental Studies we further affirm that our work has not been presented to any others universities or institutions for the award of any degree or diploma.

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ACRONYMES

MWR - Ministry of Water Resource.

UNEP - United Nation Environmental Protection.

WHO - World Health Organization.

CSA - Central Statistical Agency.

UNWWAP - United Nation World Water Assessment Program.

GDP - Gross Domestic Product.

AWTI - Arba-Minch Water Technology Institute.

E.C - Ethiopian Colander.

NGO'S - Non Governmental Organizations.

ABSTRACT

The purpose of this study was to assess the challenges of domestic water supply in Mersa town in the case of 02 Kebele. Therefore, 50 sample respondents were selected from the target population of 2495 house hold in the study area, through Simple random methods. The data were obtained through interview, questioners and field observation. Data was analyzed by qualitative and quantitative method. The result of the study depicts that major challenges were identified such as lack of water source, high population growth, shortage of finance, management problem and lack of skilled man power. Based on the findings, the researchers were forwarded government should construct other alternative source of water. The society must organize and make cooperation with the government to find solution of the problem. Finally, the researchers were recommended the concerned body/responsible authorities to ensure sustainable water supply in providing.

KEY WORDS

Domestic water supply, Mersa town,

CHAPTER-ONE

1. Introduction

1.1. Background of the Study

Water is a transparent fluid substance and most important resource of any country, which we can get from streams, lakes, oceans, and rain. It is the most important or vital for all earth's life or living things. In fact, without water there is no life. There are many purposes of water. Those are: for drinking and culinary uses, for washing, bathing, and laundering, for cleaning windows, walls and floors, for providing hydraulic and stream power, for employ numerous and varied industrial process, for protecting our life properly against fire etc. Water is a necessity in every day of our life. In our home, office, industries and even in our personal journey there is always the need for continual water supply to meet our basic water need (Sombo.T, Mitsugu Saito, Yasumoto Magara, 2008).

Water supply service in urban center is again one of the crucial for the economic as well as social welfare and development for both developed and developing countries in the world. Water is an environmental factor that is essential for most process in the environment and also indispensable to human development and well-being (Daniel chiros 2012). All most all millennium development goals issued by united nation are directly connected to water as a resource. Enough water supplies are essential to humans and other life forms, even though it provides with no or with different organic nutrient (Mimi and Modan, (2010).

Access to water supply has improved time to time in almost every part of the world, but approximately one billion people lack safe drinking water. The significance of water to human and other biological systems cannot be over emphasized and there are numerous scientific and economic facts that water shortage or its pollution can cause severe disease in productivity and deaths of living species (Garba, 2008). Access to water supply in Africa have estimated about 19% of peoples in rural area have access to safe drinking water supply and the population access to safe drinking water is increase from time to time and there is a clear coloration between access to safe water and GDP per capital of countries. North east Africa countries is believed as not yet developed or one of the least developed countries in water supply, even though potentially rich in water supply

resource, due to the lack of financial and human capital to utilize the available water resource (Daniel, 2002).

Ethiopia is the water tower in east Africa. However, still the cities and towns are facing water supply problems as the result from different factors mainly natural and human made factors those are increasing number of population, nature of topographic, lack of easy accessible ground water and skilled man power, miss management and unattainable use of the existing water resource (Sons, 2016). This is true when we came to our study area. In the study area, there is low level or problem in domestic water supply. Therefore, the aim of this study was fill the existing gap in knowledge and assessing the problem of domestic water supply for our target area.

1.2 Statement of the problem

Safe and clean water supply improves our health status and increases our life. However, water supply problem is a global issue and need a global attention to reduce existence of the problem and shortage of water supply, which is increasing time to time especially in rapidly growing urban area of developing countries (Deichman and s.v.lall, 2007).

Studies show that the population of most developing countries is exposed to hardship and many diseases that are resulted from the shortage of absence of proper supply of social services like pure water supply. In Ethiopia for instance about 70% of the disease in the country is believed to be related water related (AWTI, 2007).

Low levels of water and sanitation coverage also have important social implication in Africa, woman and children spend several hours every day fetching water. As a result, the time spent for fetching water could be used to care children in the home rest or employment income generating activities. Ethiopia is one of the least developed in domestic water supply and mostly characterized by service deficiencies due to low level of physical infrastructure, shortage of skilled man power and in adequate management capacity with increasing demand of domestic water supply (Tesfaye, 2006).

Studies demonstrate that the rapid urban population growth in developing countries is primarily driven by economic, social, and cultural factors, often resulting from high birth rates and migration from rural areas in search of employment opportunities and better social services. This urbanization

process poses challenges to service delivery, including domestic water supply, leading to imbalances in water distribution and difficulties in maintaining extensive coverage of expanding urban areas (Kundzewicz et al., 2016).

Actually, the people of Mersa town are unable to get sufficient water to fulfill their day to day activities. Mersa town share in common with other growing cities of similar scale in Ethiopia faced major challenges in relation to delivering its water resources. In the study area there is serious problem or challenge of domestic water supply in our study areas, due to different constraint, for instance shortage of electric power, increasing number of population, finance and skilled man power and unattainable use of the existing water resource.

Even though, problems grow more serious from time to times, there was no detailed and applicable research made previously to solve the issue in the study area. Therefore, this study was initiated to assess the challenges of domestic water supply problem, which helps to fill the gap and to indicate the direction how to improve with easily applicable solution forwarding to the community as well as the stakeholder who engaged in domestic water supply in the study area.

1.3. Objective of the study

1.3.1. General objective

The general objective of the study was to examine the challenges of domestic water supply in case of Mersa town.

1.3.2. Specific objectives.

The specific objectives include:

1. To investigate the main source of domestic water supply in the study area
2. To assess the actual and potential uses of domestic water supply
3. To identify the main challenges of domestic water supply in our study area.
4. To suggest the possible solution for water supply problem in the study area.

1.4 Research Questions

1. What are the major sources of domestic water supply in the study area?

2. What are the main problems or constraint for water supply in the study area?
3. What are the actual and potential uses of domestic water supply?
4. What are the possible solutions for domestic water supply problem to be suggested for our study area?

1.5. Significance of the study

The findings of this study were important to help the town administration in solving their problems in relation to challenge of domestic water supply. It also serves as a working document to policy makers in the water sector for the local governments and for the non-governmental organizations. The study also served as benchmark for further investigation those who conduct on the same topic.

1.6 Scope of the study

This study was limited to Habru Woreda particular reference of Mersa town on the title of assessing the challenges of domestic water supply.

1.7 Limitation of the study

Some of the limitation that encountered the researchers at the time of the study was financial constraints, lack of documented data from the Keble (02) administrative office and undulated topography of study area.

1.8. Organization of the paper

This research paper has five chapters, the first chapter deals about back ground of the study, statement of the problem, objective of the study, research question, Significance of the study, scope of the study and limitation of the study. The second chapter deals with literature review. chapter three deals about research methodology and description of the study area, chapter four deals about data analysis and interpretation and the last chapter five deals with conclusion and recommendation of the study.

1.9 Definition of Terms/ Operational Definition of Terms

Domestic water: - It is water used for indoor and outdoor household purpose for all thing you do at home; to drink, preparing food, bathing washing clothes. Etc.

Potable water: - Is also known as drinking water that is safe to drink or to use for food preparation without risk of health problem.

Available domestic water supply: - is available water supply can be from water directly on the surface in a lake, river, spring and pond or obtained from ground.

CHAPTER-TWO

2. Review of Related Literature

2.1. Importance Water Resource and Cycle

2.1.1 Importance of Water Resource

Water is a vital natural resource which forms the basis of all life. Further, water is a key resource in all economic actives ranged from agriculture to industry. With ever increasing pressure of human population, there is severe stress on water resources. It is one of the abundant resources which are important for life. Nearly 71% of the earth's surface is water and most of the bed rocks are saturated by water. Water is also one of the environmental and biological factors. And, most of the environmental contrasts are direct or indirect influences of water. Water supply in urban center is again one of the crucial services for the economic as well as social welfare and development for both developed and developing country in the world. water is an environmental factor that is essential for most processes in the environment (warren. viesman,2009) Domestically, water is important to use for drinking it to survive and have many other uses of water, such as:- cooking, washing their bodies, washing clothes, utensils; such as bellies, saucepans, crockery and cutlery keeping houses and communities clean, recreation; such swimming pools keeping plants alive in gardens and parks etc.. Water is also essential to agriculture for the healthy growth of farm crops and farm stock. Water also used in the manufacture of many products. Water is one of the most important elements in construction but people still ignore quality aspect of this element. The water is required for preparation of mortar, mixing of cement concrete and for curing work etc. during construction work. The quality and quantity of water has much effect on the strength of mortar and cement concrete in Construction work (Santosh Kumar Garg, 2014).

2.1.2. Water Cycle /Hydrologic Cycle

Hydrologic cycle is a natural system embracing the endless circulation of water between the ocean, the atmosphere and land. It also describes the continuous movement of water on above and below the earth surface. The sun which drives the water cycle radiates solar energy on the oceans and land. Water evaporates as vapor into the air. Ice and snow can sublimate directly into water vapor. Evapotranspiration is water transpired from plants and evaporated from the soil. Rising air currents

take the vapor up into the atmosphere where cooler temperatures cause it to condense into clouds. Air currents move clouds around the globe, cloud particles collide, grow, and fall out of the sky as precipitation. Some precipitation falls as snow and can accumulate as ice caps and glaciers, which can store frozen water for thousands of years. Most precipitation falls back into the oceans or onto land, where the precipitation flows over the ground as surface runoff (Mimi Massaikia and Modan Mohandas, 2010).

A portion of runoff enters rivers in valleys in the landscape, with stream flow moving water towards the oceans. Runoff and groundwater are stored as freshwater in lakes. Not all runoff flows into rivers. Much of it soaks into the ground as infiltration. Some water infiltrates deep into the ground and replenishes aquifers, which store huge amounts of freshwater for long periods of time. Some infiltration stays close to the land surface and can seep back into surface-water bodies (and the ocean) as groundwater discharge. Some groundwater finds openings in the land surface and comes out as freshwater springs. Over time, the water returns to the ocean, where our main water cycle started.

A hydrological cycle is the global sun drive process whereby water is transported from the oceans to the atmosphere to the land back to the sea. A hydrological cycle has no starting points. The ocean is the principal reservoir it stores over 97% of the terrestrial water. Water is evaporated by the sun in corporate in to clouds as water vapor, falls to the land and sea as precipitation and ultimately finds its way back to the atmosphere through a verity of hydrological process. Ices and snows can sublimate directly into water vapors, rising air current takes the vapor up into the atmosphere a long with water from evapotranspiration which is water transpired from plants and evaporated from the sails. vapor rises into the air where be cooler temperatures causes it to condense into clouds air currents move clouds around the globe, cloud particles collide growth and fall as snow and accumulate as ice caps and glaciers which can store frozen water for thousands of years. Snow packs in warmer climates often thaw and melt when spring arrives and the melted water flow over Lands as snow melt. Most of the precipitation falls back in to the oceans or on to lands where over land's as snow melt. Most precipitation falls back in to the ocean or on to the land where due to gravity the precipitation flows over the runoff enters river in valley in the lands scope with stream flow moving water to words the oceans. Run off and ground water seepage accumulate and stored as fresh water in the lakes not all run off flows in to river through much as its soaks in to the ground as infiltration. Some water infiltrates deep in to ground and replenishes aquifers (saturated sub surface rocks) which is store huge amount of fresh water for long period of the times. Some

infiltration stays close to the land surfaces water bodies and the oceans as ground water discharge and some ground water find opening in the land surfaces and emerging as fresh water spring. Over time through all of this water keep moving some to reenter the ocean where hydrological cycles "ends" where it "begins" (Mimi Dassaikia and Modan Mohandas, 2010).

2.2. Global distribution of water

The estimates of the total amount of water on the earth and in various processes are presented in Table below. It can be seen that most of the earth's water is in the oceans (96.5%). Fresh water is only a small proportion of the total water (2.5%) and mainly stored in the ice. Groundwater is much more important than surface water as a resource.

Table 1 Global water distribution

Reservoir	Volume (cubic km x 1,000)	Percent of total	Percent of fresh water
Oceans	1338000	96.5	
Ice Caps and Glaciers	24364.1	1.8	69.6
Groundwater (Fresh)	10530	0.76	30.1
Groundwater (Saline)	12870	0.93	
Lakes (Fresh)	91	0.007	0.3
Lakes (Saline)	85.4	0.006	
Soil Moisture	16.5	0.001	0.05
Atmosphere	12.9	0.001	0.04
Streams and Rivers	2.12	0.000	0.006
Marshes	11.47	0.001	0.03
Biosphere	1.12	0.000	0.003
Total	1385985	100.0	
Fresh water	35029	2.5	100

Source: (UNEP, 2002).

2.3. Water coverage/Resource in Africa

Africa is a home of different major lakes including the second largest fresh water lake in the world, Lake Victoria. African water resources are also characterized by the multiplicity of Trans boundary

water basins. They cover 64 percent of the continent's land area and contain 93 percent of its total surface water resources. There are about 80 trans-boundary River and lake basins in Africa and over 38 trans-boundary aquifers.

Groundwater is the main source of drinking water for more than 75 percent of the African population. Withdrawals of water are estimated to be about 3.8 percent of total annual renewable water resources. These withdrawals are used mainly for agriculture at 85 percent of the total, for community water supply at 9 percent, and for industry at 6 percent. Therefore, there is a high potential for development of Africa's renewable water resources, although this potential can be realized only in certain areas because abundant renewable water resources are not distributed evenly over the continent (UN, 2012).

Sufficient water is essential to every one's well-being. Yet merely 20% of the world population does not have ready access to water and 40% lakes sanitation facility, the vast majority of those people are developing country. Much of sub-Saharan countries are facing serious water constraint. It is predicated that by 2025 as many as 230 million will be living in African country facing water scarcity. The two-third of the world's population will not have access of freshwater by the rear 2025. The rate at which Africa's gained access to improved water resource is less than 40% including our country Ethiopia. (Larson, 2006).

2.4. Water Resource and Supply in Ethiopia

Ethiopia is one of a few African countries with enormous water resource. Evidently by African standards Ethiopia is a country of large abundant water resources which found in lakes, rivers and ground water etc. However, there is limitation to exploit or use her water resource due to economic and technological backwardness of the country. In the country level, urban water supply is better situation relatively compared with rural part of the country. And also slowly improving that about 76% of urban population are believed to have access to pure water for their household use, but when we come to rural area the condition is very poor, it cover about 18% of total rural population that constitute 85% of total population of the country which is estimated to have service from protected or pure water supply system. Water resource in Ethiopia mainly categorized in 12 major basins which is listed below in the table (Tesfaye, 2006).

Table: - 2.2 Major basin in Ethiopia.

River	Catchment area in km^2	Average annual discharge in billion m^3
Abay & Akobo	199813	54.4
Awash	112700	4.9
Baro	74102	13.23
Genale & Dawo	171030	6.1
Tekeze	90000	8.2
Wabisheble	200214	3.16
Omo gibe	78200	16.6
Mereb melash	5900	0.72
Rift valley lakes	52740	5.67
Afar(Danakil)	74002	0.86
Ogaden	77100	0,00
Ayshal	2200	0,00
Total	1138016	122.19

Source: - (MWR, 2000).

Ethiopia is estimated about that total of 122.19 million m^3 of water is discharged from the above listed river basin annually. The Wabishebele River has the largest catchment area while River Abay 9 which contributes 70% total rants first in terms of annual discharge (MWR, 2000).

2.5. Water Supply Status in Amhara Region

Amhara region is the source of Blue Nile start from LakeTana. The Amhara highlands receive 80% of the total rain fall of Ethiopia and the region is fertile and hospitable region in Ethiopia. The region done different activity to deliver domestic water supply for the society as much as possible from different technologies are employed at urban and rural water supplies throughout the Amhara region like:- construction of pipe, gravity springs, hand dug well with hand pump, shallow wells with hand pump and solar driven pump(in little) and borehole with diesel powered pump, but still not sufficient domestic water supply due to the imbalance of water supply and desire of people to water supply. On the other hand, due to unwise use of water resource management resulted Drying up and water supplies Deterioration or water quality problem (Seifu, Amy and Manyahlshal, 2010).

2.6. Water Supply Status in Mersa Town

Mersa town collect water from rain and river in the summer season for their animal and washing purpose and mainly Mersa town get pure water from the ground with in insufficient amount of water service. In Mersa town there is low status of water supply due to different problem likes, electric power, material, skilled man power etc. (Annual report of socio-economic, political and physiographic, 2016)

CHAPTER-THREE

3. Description of the study area and Research Methods

3.1. Description of the study area

3.1.1 Location

Mersa town is found in north wollo zone and it is the capital of Habru Woreda. The town is absolutely located 11°40′N latitude and 39°39.5′E longitude. Mersa town is found at 491 km from Addis Ababa in Habru district and from administrative town. Mersa is located at 385km from north Wollo administrative zone located at 30km in Amhara region, Ethiopia. Mersa town is located along Ethiopian Highway 2 (Annual report of socio-economic, political and physiographic condition, 2016)

3.1.2. Topography

The average altitude of the town ranges from approximately 1200 to 2350 meters above sea level. The town's terrain is predominantly uneven, with over 65% consisting of hilly and mountainous areas. The landform is characterized by rugged topography, surrounded by chains of mountains with varying elevations. The steepness of the terrain poses challenges for infrastructure development (Siray, Wondosen, & Yisraw, 2015).

3.1.3. Climate, Rain Fall and Temperature

Mersa town is situated at an altitude ranging from 1200-2350m above mean sea level which is grouped in the agro ecological zone of semi-arid tropical belt of north-eastern Ethiopia. Its mean annual maximum and minimum temperatures were 28.5°C and 15°C, respectively, whereas the mean annual rainfall of the district varied from 750 to 1000 mm. It receives a bimodal rainfall, namely the main rainy season (summer) and short rainy season (belg). The main rainy season extends from the beginning of July to mid of September while the short rainy season starts by the end of January and lasts up to the end of April (Siray, wondosen and yisraw, 2015).

3.1.4. Vegetation Cover

In Mersa town there is indigenous vegetation. These are Acacia Saligna, Acacia Albidia, Gravilia, and Spatodia Jaccarangha, which all have economic benefits. However, the surrounding is not

suitable for vegetable farming as it does not have enough water (Annual report of socio-economic, political and physiographic condition, 2016.

3.1.5. Demographic Characteristics

Based on the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA, 2007), Mersa town has a total population of, 23608 of whom 12861wo men and 10747 men with total house hold of 6044, from this whom 3281 is men and whom 2763 is women. The majority of the inhabitants practiced Ethiopian Muslim. Economically more of the society engaged on trading activity, especially in the center of town and around the town more of the society engaged on agriculture.

3.1.6. map of the study area

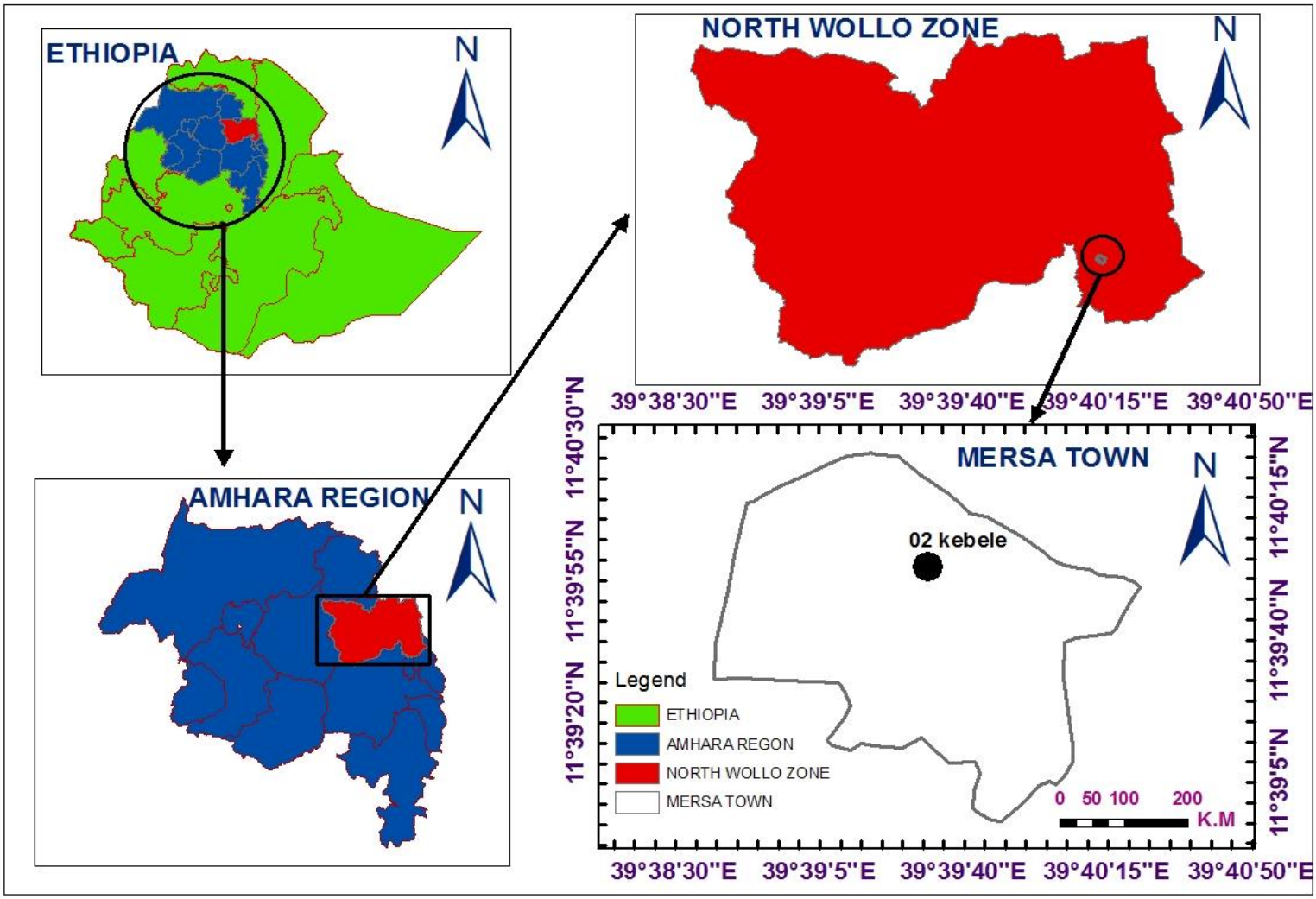


Figure 1 Map of Mersa town.

Source: - Developed by the team of the Researchers' (2024)

3.2 Research Methods and materials

3.2.1 Research Design

In this study the researchers were employed descriptive research design in order to describe current situation of the problem of domestic water supply in the town.

3.2.2 Data Types and source

In order to obtain relevant data about challenge of domestic water supply the researchers were used both primary and secondary data source. The primary data sources were first hand data which was obtained from the local community, officials through interview, questionnaire and observation whereas secondary data source was collected from official documents, internet, and library (from different books, journals, articles and magazines).

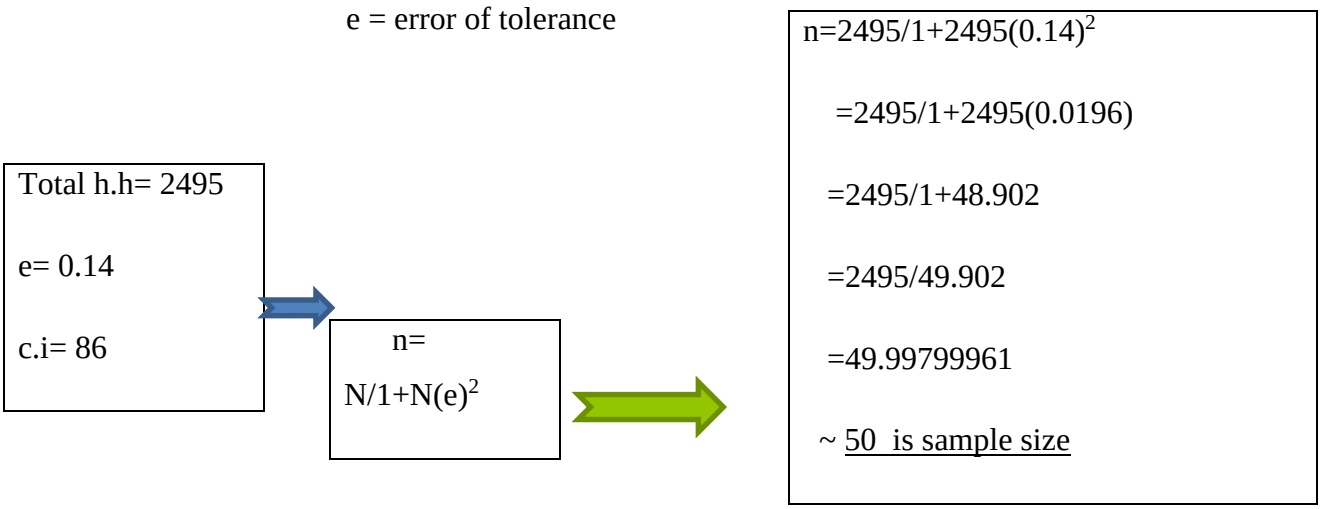
3.2.3. Sampling Technique and Sample Size

According to Mersa town administrative office, there are two Keble (01 and 02) in the study area. The researchers were employed both probability and non-probability sampling. From probability sampling techniques the researcher was used simple random sampling because this sampling method gave equal chance for all the respondents under study. From non- probability sampling purposive sampling was used since the study area was deliberately selected. By considering the availability of budget and time, the researcher took 50 samples from the total 2495 households. The sample size is calculated as follows by using Yamane formula: -

$n= N/1+N(e)^2$

where N = total household

n = sample size



3.2.4. Data collection instrument

The researchers were used three data collection instruments for this study. These were questionnaire, interview and observation.

1. Questionnaire.

The researchers were used questionnaire to gather information from the respondents the questionnaires were consists both closed and open ended questions, and the questionnaires were first prepared in English and later translated in to Amharic to get reliable data from the subjects. Closed and open ended types of questionnaires allow the respondents to answer the questions in multi- dimensional ways and this is used to get all possible answers. The researchers were distributed the questionnaires for the respondents.

2. Interview.

Structured interviews were conducted with personnel from relevant administrative units, including water supply staff, Mersa town administration office, and administrative staff from the 02 Keble administrative office.

3. Observation.

The researchers were observed the study area in relation to the problem of domestic water supply was concerned. The actual observations helped the team of the researchers to fill the gap of data bias. The researchers' use mobile phone to capture image, which important to support the study.

3.2.5. Method of data analysis

In order to analysis and interpret the collected data from respondents and different documents, the researchers were used both quantitative and qualitative methods. Quantitative method was employed to describe data in numerical valve such as tables and percentages whereas Qualitative data analysis method was used to describe the collected data in words or statements.

CHAPTER FOUR

4. DATA ANALYSIS AND INTERPRETATION

This chapter deals with presentation, analysis and interpretation of the data collected from respondents through questionnaires, interview and personal observation. It includes back ground information of sample respondent like age, sex, educational background, occupational status, marital status, family size, and are presented in this section).

4.1. Sex Structure of Sample Population

Table 2 Sex Composition of the Respondent

Sex	Frequency	Percentage
Male	27	54%
Female	23	46%
Total	50	100%

Sources: Field survey, (2024)

As shown in the above (table 2), 27 (54%) of the total respondents were males and the remaining, 23 (46 %) respondents were Females. This indicates that from the total respondents participated in this study the numbers of male respondent were greater than female respondents.

4.2. Age distribution of Sample population

Table 3 Age group of sample population

Age group	Frequency	Percentage
Below 30	30	60%
31-40	4	8%
41-50	7	14%
51-60	6	12%
Above 60	3	6%
Total	50	100%

Sources: Field survey, (2024)

As the above (table 3) depicts, from the total sample population about, 30 (60%) were found in the age group of below 30 years old, 4(8%) were found in the age group of 31 - 40, 7(14%) were found in the age of 41 - 50, 6(12 %) were found in the age of 51-60 and the rest 3(6%) were found in the age of above 60. From this the researchers conclude that the majority of the respondents were found in the age group of below 30.

4.3. Education Background of Sample Population

According to the information obtained from the survey of the sample respondents their education level was literate or have able to read and write.

Table 4 Educational levels of respondents

Level of education	Frequency	Percentage
Illiterate	-	-
Primary school	6	12%
Secondary school	29	58%
Above Secondary school	15	30%
Total	50	100%

Source: Field survey, (2024)

The above (table 4) shows that, from the total sample population 6 (12 %) were attended primary school level, 29(58 %) secondary school level, and the remaining 15(30 %) were attended above secondary school. Therefore, these indicate that in the study area the majority of the respondents were literate and able to read and write.

4.4. Occupation of the Sample Population

The analysis of data on the table 5 below shows that 17(34%) of the respondents in the study area were replied that they were engaged in farming and other activities such as daily laborers respectively, (18%) were civil servant employed and the rest 7(14%) were engaged in trading. From this we can conclude that the highest proportion respondents were engaged in agricultural activity and daily worker around the town.

Table 5 Occupation of the Sample Respondent

Occupation	Frequency	Percentage
Trade	7	14%
Farming	17	34%
Civil servant employed	9	18%
Others	17	34%
Total	50	100%

Sources: Field survey, (2024)

4.5. Marital Statuses of Sample Respondents

Table 6 Marital statuses of sample respondents

Marital status	Frequency	Percentage
Marred	13	26%
Single	37	74%
Divorced	-	-
Windowed	-	-
Total	50	

Sources: Field survey, (2024)

According to the above (table 6), among the total respondents in study area 37 (74 %) them were marred and the rest 26% were. From this, we can deduce that the majority of the respondents were single.

4.6. Family size

Based on the data observed below in (table 7), the researchers were categorized the respondents in to different class of family size. From which most of the respondents had household members of 1-5, and it accounts about 38(76%) the rest 12(24%) were categorized under the class of 5-10. From this we can conclude that as the number of family size increases, the water consumption rate also increases.

Table 7 Family size of the respondents

Family Size	No of household people	Percentage
1-5	38	76%
5-10	12	24%
Abov10	-	-
Total	50	100%

Source: - field survey (2024)

4.7. Annual Average Income of Sample Respondent

Table 8 Annual average income of sample population.

Average annual income in birr	Frequency	Percentage
Below 10,000	13	26%
11,000-30,000	9	18%
31,000-60,000	11	22%
61,000-90,000	9	18%
Above 91,000	8	16%
Total	50	100%

Source: - field survey (2024)

As indicated in the above (table 8), from the total respondent 13(26%) had an annual income of below 10,000, 11(22%), had 31,000-60,000, 9(18%) had 11,000-30,000, and 61,000-90,000, and the remaining 8(16%) had above 91,000. From this we can deduce that most of the respondents had low income and this led to the respondents unable to access potable water for their family.

4.8. Water availability problem in the town

Water is very essential for all organisms. Potable water is one of the basic requirements of urban population. However, domestic water supply was a problem in the town as the information obtained from the respondents. The following table depicts water supply related problem.

Table 9 Water problem in the town

water availability problem	Frequency	Percentage
Yes	50	100%
No	-	-
Total	50	100%

Source: - field survey (2024)

As (table 9), shows above, 100% or all of the respondents were replied that there was problem of availability of water supply in the town. Therefore, we can develop a conclusion as the livelihood of all peoples who are living in the study area has been highly affected by the scarcity of availability of water supply in the town.

4.9. Source of domestic water supply in the town

Respondents were asked to indicate source of water supply. In the study area people were used various water sources to satisfy their daily water requirement.

Table 10 Source of water supply

As shown in the below (table 10), the main source of domestic water supply for more of the respondent about 29(58%) were pipe water, 8(16%) spring, 6(12%) river, 5(10%) other and the remaining 2(4%), pond. even though more of the respondents were used pipe water, however, its supply poor as we stated below.

source of water supply	Frequency	Percentage
River	6	12%
Pond	2	4%
Spring	8	16%
Pipe	29	58%
Other	5	10%
Total	50	100%

Source: - field survey (2024)

4.10. Alternative source of water supply at the time the pipe water was not available

Table 11 Source of water when the pipe was not functioned.

Where do you get water when the pipe doesn't work	Frequency	Percentage
River	22	44%
Pond	8	16%
Spring	19	38%
Other	1	2%
Total	50	100%

Source: - field survey (2024)

As shown in the above (table 11), at the time of pipe was not functioned 22(44%) the supply of water in the town was found from the river, 8(16%) were from pond, 19(38%) were from spring, and the remaining 1(2%) were from other (it includes rain water harvesting). From this the teams of the researchers can deduce that river was the main source of water supply for the town.

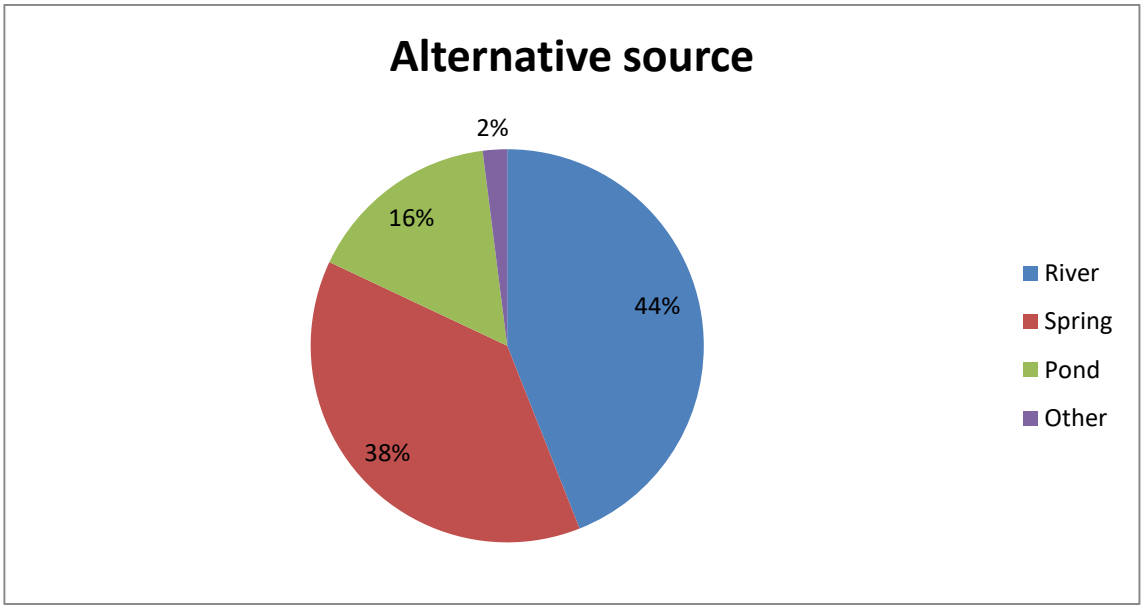


Figure 2 Alternative sources water in the town.

According to our observation also the river was the main source of supply; you can see in the figure below the people fetched their water from the River.



Figure 3 Image of water collectors from the River around the town

Source: -field observation (2024).

4.11. Distance of Water source or Supply

The distance travelled to collect water is one of the factors that limit the amount of water that households were used. The effect of distance on water supply is very great. As distance increase supply of water become decline.

Table 12 Respondents responses towards distance travel to get water

Distance in Meter	Frequency	Percentage
Less than50m	21	42%
51-150m	14	28%
151-250m	6	12%
251-350m	3	6%
Greater than 360m	6	16%
Total	50	100%

Source: - field survey (2024)

The data presented in Table 4.12 illustrates the distance traveled by respondents to obtain water, revealing insights into the accessibility of water supply within the community. The majority of respondents (42%) reported traveling less than 50 meters to access water, followed by 28% traveling between 51 to 150 meters. Only a small percentage of respondents reported traveling

greater distances, with 12% traveling 151 to 250 meters, 6% traveling 251 to 350 meters, and another 12% traveling more than 360 meters.

This distribution suggests that a significant portion of the community has relatively easy access to water sources, as evidenced by the majority traveling short distances. However, it is notable that a portion of the population still faces the challenge of traveling longer distances to obtain water, potentially indicating areas where water supply infrastructure may be inadequate. Further analysis and consideration of the specific geographical and socio-economic factors influencing water accessibility are warranted to address any disparities and ensure equitable access to clean water within the community.

4.12. The Existing Water Demand in the Town

Most of the time the supply water and the demand of water by population whether it is urban or rural in any country is miss-matched. This is true in Mersa town

Table 13 Respondent responses towards the existing of water demand.

As it was observed in the below (table 44), (88%) of the respondents were replied that the existing water supply did not satisfy their demand and the remaining 6(12%) were responded that they were satisfied by the existing water supply situation in the town. The data collected through informal interview (in time of observation) the majority of the respondents were unsatisfied with existing water supply. Upon further analysis, it was observed that the majority of respondents who were satisfied with the existing water supply were engaged in low-consumption activities or had less demanding water requirements in their livelihoods. In contrast, those expressing dissatisfaction were often involved in high-demand water activities such as hotels, manufacturing, and other commercial enterprises.

Does the existing water supply satisfy your demand?	Frequency	Percentage
Yes	6	12%
No	44	88%
Total	50	100%

Source: - field survey (2024)

This discrepancy highlights the challenges faced by the town in meeting the water demands of its growing urban population. It suggests a need for improved water infrastructure, expanded access to water sources, and enhanced management practices to ensure adequate and equitable water supply for all residents, especially those engaged in high-demand activities. Addressing these issues is crucial for promoting sustainable development and improving the quality of life in Mersa town.

Table 14 How much litter water do you can get in a day?

Possibility(in litter)	Frequency	Percentage
Below 10	20	40%
10-15	22	44%
Above 15	8	16%
Total	50	100%

Source: - field survey (2024)

The above (table 14), shows that 20(40%) of the sample respondent consume below 10 litter, this indicate domestic water supply is faced on more serious problem in the study area, 22(44%) of the respondent consume an average of 10-15 litter, this distribution highlights the challenges faced by residents in accessing sufficient water for their daily needs. The majority of respondents are consuming relatively low amounts of water, indicating potential inadequacies in the water supply infrastructure or availability. This indicate neither provide sufficient water nor severe the whole population in the study area, 8(16%) of the respondent consume above 15 litter in a day.

Figure 4 shows that respondent response on the existing water supply status in the town

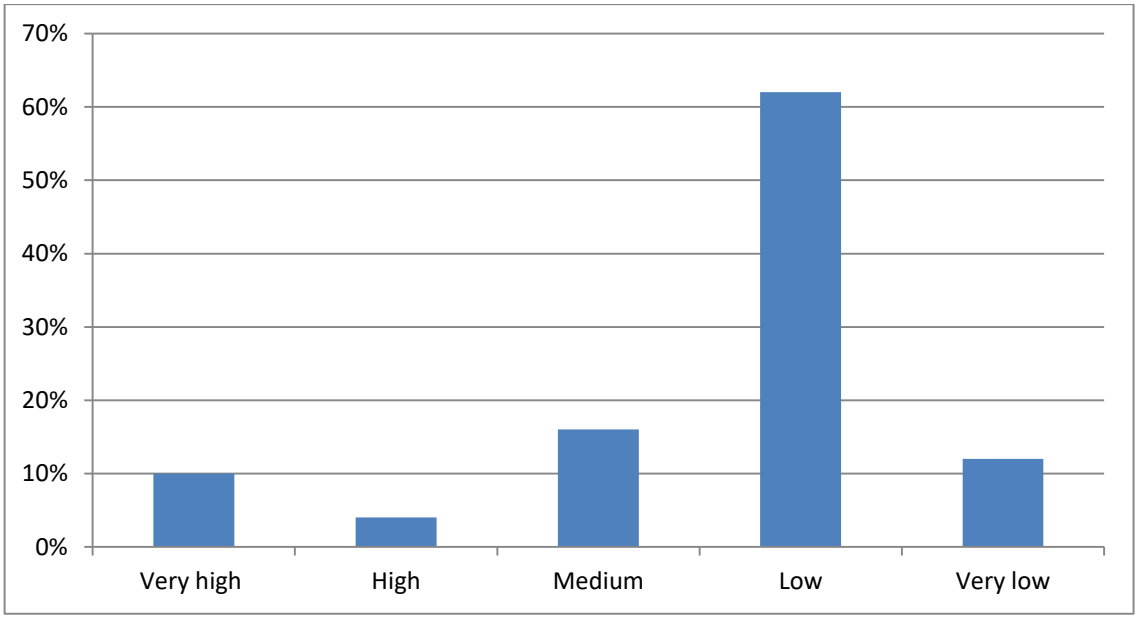


Figure 4 existing water supply in the town

4.13. Factors Affecting Water Supply in the Town

There are different factors which affect the supply of water in the town. The following table depicts factors affecting the supply of water in Mersa town.

Table 15 factors affect water supply.

The below (table 15), shows that from the total sample population 16(32%) replied that lack of water source was the main factors that affect domestic water supply in the study area, 14(28%) responded that high population pressure in the town was the second main challenge of domestic water supply and the remain 9(18%), 8(16%), 3(6%) were lack of management, lack of finance and others (including lack of skilled man power) respectively.

Factors/challenges	Frequency	Percentage
High population growth	14	28%
Lack of water source	16	32%
Lack of finance	8	16%
Lack of management	9	18%
Other	3	6%
Total	50	100%

Source: - field survey (2024)

According to the sample respondent expression in the town factors affecting domestic water supply is shortage of water source supply, high population density ,shortage of finances, electric power interruption, broking of water network, lack of well(which support pipe water supply),lack of equipment, low participation of the community, topography, carelessness of the workers of domestic water supply, drought(it shrink available water source), distance of water source, and lack of coordination were identified as the problem. The data which is collected through the interview from the water supply office of the Mersa town by the researcher's also showed that there were factors that affect domestic water supply and services delivery obstacle like low involvement of community and inadequate operation and maintenance with lack of budget are major challenge and became obstacles in the supply of water to the society include the above mentioned thing.

4.14. Possible solution to minimize the challenge forwarded by sample respondents

According to our sample respondent suggestion, the possible solution for domestic water supply problem is forwarded that or as they said for the future, strengthening the better plan of project that started and additional lunching of project to distribute and balance the pipe water supply with population number and use the water properly. According to water supply office there are various role expected from the local community or people play, some of these role play local community or people include providing labor force, participating in policy implementation by considering the problem that faced them from water supply problem to involve in every aspects of domestic water supply practice providing necessary equipment's as much as possible and also give different suggestion up on domestic water supply system.

Developing underground water wells and supplying water via water tanker vehicles. Promoting water development projects to address the problem by controlling population growth through proper family planning, reducing improper use and extravagance of water resources and creating awareness within society about sustainable water usage.

Water resource management must be cooperating with other sector like electric power service sector to fulfill or balance the water supply and demand of society in the town.

Finding or introducing new plan and project to address water supply coverage for all customers in the town and working cooperatively with governmental institution and non-governmental institutions like NGO, and other interesting group.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

Water is the basic component of life and Human dignity the life of Human being directly or indirectly dependent on the availability of water. In any part of the world, the availability of adequate and safe water is very important for the development of each nation. However, the rapid growth the urban areas with highly increasing population number have generally unattainable (unsuccessful) corresponding expansion, when deliver/utilize water in developing countries including Ethiopia. The main or dominant factor of challenge the domestic water supply of the study area is high population density, lack of source of water, shortage of finance (lack of sufficient fund), management problem and others (it include lack of skilled man power, inefficient organizational, structure, and inadequate operation and maintenance of the pipe networks).

The study reveals that male respondents (households) were very high as compared with female house hold respondents. As far as age compositions were concerned the majority of the respondents are found less than age 30. The study also revealed that the majority of the respondents were able to read and write as well as religiously they were Muslim dominant.

From economic point of view, the study depicted that the majority of the respondents were farmers and others (daily laborers) depend on agricultural production. Besides, the majority of the respondents had low annual income.

As the study shows domestic water supply was declined in the study area and there was high demand of water by the population of the town. Even though domestic water supply was existed in the town; the problem of water was more prevalent. The main factors that affect domestic water supply in the town were included lack of water source, high population pressure in the town, lack of finance, lack of management, lack of commitment of workers and co-ordination, topography, and low community participation.

5.2. RECOMMENDATION

Based on the above findings the following recommendations were made: -

- There was domestic water supply problem in the study area. Therefore, local government and community must enhance the supply by developing, identifying, and constructing different source of water for the town.
- There was low skilled manpower. Hence, the local and regional government must fulfill skilled man power via training.
- There was maintenance related problem in the town. Therefore, water and sewerage office in collaboration with regional government should give training for the workers to enhance their capacity.
- There was low community participation in developing domestic water supply. Hence, local government in collaboration with the community should develop potable water for the population of the town.
- There was financial and budget related problem in the town to enhance domestic water. Hence, appropriate budget for the sector must be allocated by the government.

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Appendix I

WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

Questionnaire to be filled by study respondents

We, graduating class students of Geography and Environmental Studies at Wolkite University, College of Social Sciences and Humanities, This questionnaire is prepared by Tewodros, Tilahun. The purpose of the questionnaire is to gather information about assessing challenge of domestic water supply in case of Mersa town. Information obtained from the respondents is employed only for research purpose and the confidentiality is kept greatly by the researchers. Therefore, we are kindly requested you to give genuine and valuable information for the success of our study.

Dear Respondents, be free while responding the questions and put tick mark "□" on the box provided bellow. No need of writing name.

Thank you in advance for your co-operation

PART 1: Socio-demographic characteristics

1, Sex: ☐ Male ☐ Female

2, Age (in years) _____

3, Marital status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed

4, Educational status: ☐ Illiterate ☐ Primary level

☐ Secondary level ☐ More than secondary

5, Religion: ☐ Orthodox Muslim ☐ Protestant ☐ Other (specify) _____

6, occupation:- ☐ farmer ☐ civil servant

☐ Daily laborers ☐ merchant ☐ if other, specify_____

7, Average annual income (in Ethiopian Birr): _____

8, Family size (in number): _____

PART 2: Questions related to respondents on challenges of domestic water supply

9, Is there domestic water supply problem in the town? ☐ Yes ☐ No

10, If your answer for question number 9 is: "yes "what do you think the cause for challenge of water supply in your kebele 02?

☐ High population growth ☐ shortage of water source ☐ shortage of finance ☐ Management problem ☐ if other, specify

11, Distance of water source from home in meter?

☐ Less than 50 meter ☐ 51-150 meter ☐ 151-250 meter

☐ 251-350 meter ☐ Greater than 350 meter

12, It their proposed action to reduce domestic water supply shortage, if any write it?

_____

_____

13, Do you think that the existing water supply satisfy your demand? ☐ Yes ☐ No

14, If your answer is "yes" what is the amount of production per second per litter?

15, If your answer is No what are the problems?

16, what is the source of domestic water supplies in your kebele 02?

☐ Pipe ☐ pond ☐ river

☐ Spring ☐ if other, specify_____

17, If your answer for question number 16 is pipe from where you get water when the pipe does not have function?

☐ From river ☐ From pond ☐ From spring

☐ If other, specify_____ ___

18, What do you think that the domestic water supply situation in your kebele 02

☐ Very High ☐ High ☐ Medium ☐ low ☐ Very low

19, list some, if you know or suggest the causes of domestic water supply constraint in your kebele?

_____

_____

_____)

20, list some, if you suggest some possible solutions for water supply problem in your kebele 02 ?

_____

_____

_____

Thank you!!!

Appendix II

1) What are the sources of mersa town community domestic water supply?
2) Is there domestic water supply in mersa town is sufficient? If you say no why the reason?
3) How much litter per /person is delivered in a day, in actual situation?
4) If there is any proposed action for the feature to improve domestic water supply, suggest your possible solution?
5) What are the main constraints to deliver domestic water supply for the community of Mersa town?
6) What are possible solutions or what shall be done to improve the domestic water supply in the town?