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POTABLE DOMESTIC WATER SUPPLY AND ITS SOCIO-ECONOMIC IMPLICATIONS: THE CASE OF MEJO TOWN ARORESSA DISTRICT, SIDAMA SOUTHERN ETHIOPIA

MA THESIS

BY

ASSEFA ADMASU DEBESSA

HAWASSA UNIVERSITY, HAWASSA, ETHIOPIA

JUNE, 2020

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BY

ASSEFA ADMASU DEBESSA

ID NO: GPDMR/0004/10

MAJOR ADVISOR

DEBREWORK DEBEBE (PhD)

CO-ADVISOR

FIREW BEKELE (PhD CANDIDATE)

ATHESIS SUBMITTED TO THE SCHOOL OF GOVERNANCE AND DEVELOPMENT STUDIES

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DECLARATION

I declare that this research report on "Potable Domestic Water Supply and its Socio-economic Implications: The Case of Mejo Town Aroressa District, Sidama Southern Ethiopia", submitted by me for the award of degree of Master of Art in Development Management from Hawassa University is original work and has not been presented or submitted partially or fully by any other person for a degree or diploma in any other University, and that all the source used in this research report have been properly recognized and acknowledged as in text citation and reference list.

Name Assefa Admasu Debessa

Signature_____

Date_____

Place: College of Law and Governance, Hawassa University, Hawassa, Ethiopia

Date of submission: _____

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This is to certify that the thesis entitled "**Potable Domestic Water Supply and its Socio-Economic Implications: The Case of Mejo Town Aroressa District, Sidama Southern Ethiopia".** Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Art in Development Management, the Graduate program of the School of Governance and Development Studies, and has been carried out by Assefa Admasu Debessa, Id. No GPDMR/0004/10, under our supervision. Therefore, we recommended that the student has fulfilled the requirements and hence hereby can submit the thesis to the department.

Debrework Debebe (PhD)	_____	_____
Name of Major Advisor	Signature	Date
Firew Bekele (PhD Candidate)	_____	_____
Name of Co-Advisor	Signature	Date

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We, the undersigned, members of the Board of Examiners of the final open defense by Assefa Admasu Debessa have read and evaluated his thesis entitled "**Potable Domestic Water Supply and its Socio-Economic Implications: The Case of Mejo Town Aroressa District, Sidama Southern Ethiopia"**, and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for the degree of Masters of Art in Development Management.

Abera Argo	_____	_____
Name of the Chairperson	Signature	Date
Debrework Debebe (PhD)	_____	_____
Name of Major Advisor	Signature	Date
Firew Bekele (PhD Candidate)	_____	_____
Name of Co-Advisor	Signature	Date
Akalewold Fedilu (Ass/Profesor)	_____	_____
Name of Internal Examiner	Signature	Date
Dr. Adane A	_____	_____
Name of External examiner	Signature	Date
Dr. Hanna Getachew	_____	_____
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ACRONYMS AND ABBREVIATIONS

ADF	Africa Development Fund
ADMM	Aroressa District Mejo Municipality
ADRADO	Aroressa District Rural and Agricultural Development Office
ADWMEO	Aroressa District Water, Mines and Energy Office
AU	Africa Union
BOWID	Bureau of Water and Irrigation Development
CBO	Community-Based Organizations
CSA	Central Statistical Authority
ETB	Ethiopia Birr
EWRMP	Ethiopian Water Resources Management Policy
FGDs	Focus Group Discussions
JMP	Joint Monitoring Program
KIIs	Key Informant Interviews
LPCD	Liters per capita per Day
m^3	Cubic meter
MDG	Millennium Development Goals
MOFED	Ministry of Finance and Economic Development
NGO	Non-Governmental Organizations
PDWS	Potable Domestic Water Supply
RPG	Rapid Population Growth
SD	Standard Deviation
SIWI	Stockholm International Water Institute
SNNPRs	Southern Nation, Nationalities and People Regional State

SPSS	Statistical Package for Social Scientists
UNDESA	United Nation Department of Economic and Social Affairs
UNDP	United Nation Development Program
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UN-HABITAT	United Nations Settlement Program
UNICEF	United Nations Children's Emergency Fund
UNPP	United Nations Population Prospects
UNWWAP	United Nation World Water Assessment Programme
UNWWDR	United Nations World Water Development Report
WHO	World Health Organization
WTP	Willingness to Pay
WWF	World Wide Fund for Nature

Abstract

Adequate supply of potable water helps for social and economic development and its accessibility and availability with good quality contributes for improved public health and better living standards. However, providing potable water is a serious challenge of the 21st century in developing countries. Therefore, this study was aimed to assess potable domestic water supply and its socio-economic implications in Mejo town, Sidama Southern Ethiopia. This is descriptive cross-sectional study with mixed research approach. Systematic random and purposive sampling technique was used to select study participants. Data was collected from a total of 297 respondents and from primary source using the survey questionnaire, focus group discussion and key informant interview and analyzed using SPSS V23 software and Ms-Excel. Results were presented in tables, bar graphs, pie-charts, means and standard deviations, t test and ANOVA. About 31.6% of respondents use the hand-dug well water sources. The overall average water demand and consumptions were 217.7(±8.86SD) and 116.08(±8.79SD) liters per a day to household level respectively and is not coincides with each other. The average of individual water demand and consumptions were 31.1 and 16.58 liters per a day per person respectively, which is below to recommend by the WHO. About 52.9% and 68% of respondents stated the location of water as inconvenient to fetch and the status of the town potable water supply was inadequate, respectively. About 40.7% and 39.4% of water collectors were housewives and school-age female children, respectively. About 85.9% of respondents described the insufficiency of daily piped water access. About 92.6% and 54.2% of respondents stated that as they faced serious challenge in water supply and for drinking water, respectively. Then, 70.4% and 60.9% stated that as water supply shortage put in high social and economic impact, respectively. About 62% stated government as responsible body for sustaining potable water supply. In general, the access of potable domestic water supply was poor, there were serious challenges for water supply, and water supply shortages are associated with high social and economic impact. Therefore, government and concerned body should work to supply potable water, try to minimized challenges through building institutional capacity, providing finance and diversifying water source. In addition, the District inter-sectoral collaboration is the necessary action to be taken in order to minimize the social and economic impact of water supply shortage.

***Key words**: potable domestic water, supply, socio-economic, Mejo Sidama, Ethiopia*

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Water is a crucial and life-sustaining natural resource and is critical for the survival of all living organisms, food production and economic development. Problems in providing adequate water supply to the rapidly growing population especially that of the developing countries is increasing from time to time. The sustainable provision of adequate and safe potable water is the most important of all domestic purposes and socio-economic advancement (Dessalew, 2017).

Domestic water use, which roughly accounts for the remaining 10% of global water withdraws, is expected to increase significantly over the 2010-2050 period in nearly all regions of the world, with exception of Western Europe where it remains constant. In relative terms, the greatest in domestic demand should occur in African and Asian sub-regions where it could more than triple, and it could more than double in Central and South America (Burek *et al*., 2016).

Globally access to safe and adequate potable water resources remains one of the major challenges in developing countries. "Three out of ten individuals 2.1 billion individuals or 29% of the worldwide population didn't use a safely managed drinking water source in 2015, of the 844 million people" and lacking basic potable water services; two hundred sixty three million people (4% of the population) spend over 30 minutes in round trips collecting water from an improved basis, while 159 million people gather potable water directly from surface water basis and nearly 60% of the latter group lives in Sub-Saharan Africa (WHO and UNICEF, 2017a).

Moreover, many urban centers around the world are facing serious problem of sustainable domestic water supply, this mostly disturbs third world countries of in Sub-Saharan Africa, the number of people without access to safe potable water increased with 23% (UN-Habitat, 2015). As clearly indicated by UNDESA (2017a) the population growth and rapid urbanization is significant driver of increasing water demand directly potable water supply and household consumption. The global population growth drastically increases, Africa and Asia account for nearly high population growth that has increases the pressure of water demands. Besides, the cities in Sub-Saharan Africa experience serious domestic

water shortages due to additive effects associated with lack of efficient, socio-politically acceptable, and transparent management of water resources (Banda, 2011).

The problem of potable water supply shortage is more severe in cities and towns of the developing world, where most of the challenges of water supply, sanitation and environmental sustainability are still unanswered (Nitin and Kumar, 2012). Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring and rainwater collection (World Bank, 2013).

Ethiopia is a country with high ground water potential that has twelve major river basins, including the Blue Nile, and eleven major lakes, which makes the country the "Water Tower" of East Africa. However, the country's groundwater potential has not yet adequately studied and access to safe potable water supplies and sanitation services in many parts of the country is the lowest in Sub-Saharan Africa (ADF, 2005). Moreover, Ethiopia like any other developing countries has many limitations to make potable domestic water supply easily accessible the reason was water demand has been increasing drastically in urban area due to many factors like rapidly growing population increasing from time to time (Desalegn, 2015).

As clearly indicated by National water policy of (2002) water is fundamental to food security, urban and rural domestic water purposes; sustainable water supply and increases the socio-economic development for the human well-being. Domestic water access sustainability depends on sustainable water supply, local economic conditions, water availability, and spatial distance of the water supply. However, inadequacy of domestic water supply highly affects the socio-economic development of the urban and rural communities' (Brown and Heller, 2017).

According to the report of Ministry of Water, Mines and Energy, access to safe drinking water increased from 23.1% in 1998 to 68.5% in 2012. However, millions of people in urban and rural areas have not been getting safe drinking water from the improved water source. In Southern Nation, Nationalities and Peoples' Regional State (SNNPRs), clean potable water supply access in terms of coverage has reached 50.66%, 75.33% and 52.5% for rural, urban and total, respectively (BoWID, 2018). In this regard, the access of

potable water supply in Sidama Zone was 60.55% and 74% for rural and urban areas, respectively in 2018.

According to Aroressa District Water, Mines and Energy Office ADWMEO (2019) report the access of potable water supply coverage are 36.4% and 24.5% for urban and rural area, respectively and over all water coverage of town is 30.8%. Mejo town is one of newly growing administrative town among the Sidama Zone with rapid urban expansion and high population growth. This rapid growth of the town has brought about a tremendous increase in the demand for urban infrastructure and services due to the dwellers of this town faced potable domestic water supply shortages and part of these dwellers have got water bought from the better households from different distance.

Such inadequate production, together with inequitable distribution system and low quality of water influence the well-being of the people in the study area particularly and the socio-economic condition of urban area as whole. The problem is also remains very severe in the study area Mejo town Aroressa district. Therefore, keeping this problem in mind this research was intended to investigate the potable domestic water supply and its socio-economic implications in Mejo Town Aroressa District, Sidama Southern Ethiopia.

1.2. Statement of the problem

The access and use of safe potable domestic water can make very important contribution to both health and socio-economic development. There is a problem of water supply in developing countries in general and Ethiopia in particular. According to WHO-UNICEF (2008) providing potable water supply is a serious challenge of the twenty-first century world considering that more than 2.5 billion people live without access to improved sanitation and about 0.9 billion survive without access to improved water supply.

Water supply has an important role in both social and economic development. Better public health, better living standards and economic developments are intimately related to the availability and accessibility of adequate water supply with good quality. In Sub-Saharan Africa the proportion of people with access to potable domestic water supply and adequate sanitation is very low to household connection which can be an indoor tap or a tap in the yard (Yitayh, 2011 as cited in Yhuala, 2015).

According to Lenton *et al*., (2008) domestic water is used for all domestic purposes like drinking, cooking and bathing in all international and national levels. Improving access to

water supply and sanitation is essential for socio-economic development, poverty reduction and for human dignity. However, the supplies of domestic water are very limited due to several factors at household levels and it also affects social as well as economic development in the societies (WHO-UNICEF, 2011).

"The daily requirement of potable water per individual for their basic needs is 20 to 50 liter/day, but more than one in six people do not have access to such amount of potable waters on their consumption" (UNESCO, 2006). Moreover, the coverage of the water distribution service was still poor. Chala (2011) stated that water supply and sanitation situation in Ethiopia is very poor, as most of the population does not have access to safe and adequate water supply and sanitation facilities. His findings concerned on access of household potable water supply and sanitation services factors was lower accessibility of water supply, high cost of piped water connection, lack of sewerage system, length of process during connection and frequent interruption in case of topography of the his study town.

As Desalengn (2012) stated in his study that combined effects of the poor water supply and sanitation facilities in the country have high impact on the economic development of the country and the living condition of the town dwellers. It also showed that as there was insufficient utilization of groundwater sources to domestic consumption and productive consumption is becoming depleted from time to time. According to the study of Yehuala (2015) assessing the potable water supply and distribution problems in Rebu gebeya town, Ethiopia, highlighted that the source of water supply was crucial in affecting the various water requirement experiences of the dwellers and water supply coverage was found to be very low and there was no additional water supply service for the town dwellers. His study also more focused on the challenges of water supply; however, it doesn't touch in detailed extra domestic water purposes and socio-economic concerns.

As concerning to Aroressa District Water, Mines and Energy Office (ADWMEO, 2019) report indicates that there are problems on potable water supply of the Mejo town like lack of adequate potable water and water related problems that rose from expansion of town vastly water needs, rapid population growth in and around the town. These insufficient potable domestic water supply conditions were creating barriers and restrict the urban resident's socio-economic development. Furthermore, regarding this some research studies conducted on challenges of water access and supply at international and national level focused mainly on big and medium cities. Yet, the challenges of potable

water supply differ from place to place for different reasons in district level on small administrative town like a Mejo. However, there was no integrated and comprehensive study done in the study area so far regarding access of potable domestic water supply and its socio-economic effects in general and particular.

Moreover, as the researcher preliminary observations revealed that the residents of Mejo town were not getting piped potable domestic water supply consistently. In addition, the residents of Mejo town were fetching water from the nearby rivers and traditional wells for their domestic purposes by using donkeys and human power to collect water. These problems are the manifestations of the gap concerning water needs and the supply has enlarged gradually and still the problems remain unsolved in the town. These are among the important motives that initiate the researcher to conduct the research on this title. Therefore, to fill the existing research gap in the study area this study assessed the potable domestic water supply and its socio-economic implications in order to address the above mentioned problems in Mejo town of Aroressa District, Sidama Southern Ethiopia.

1.3. Objectives of the Study

1.3.1. General Objective

The main objective of this study is to assess potable domestic water supply and its socio-economic effects in Mejo town, Aroressa District of Sidama Southern Ethiopia.

1.3.2. Specific Objectives

To achieve the above general objective, this study set the following specific objectives:

i) To examine the status of potable domestic water supply at household level in the Mejo town;
ii) To assess the challenges that hinder sustainable domestic water supply in the Mejo town;
iii) To assess the household socio-economic effects of potable domestic water supply shortage in the study area; and
iv) To investigate the role of the local government in sustaining potable domestic water supply in Mejo town.

1.4. Research Questions

To achieve the above specific objectives the following leading questions are formulated:

1. What is the current status of potable domestic water supply at household level in Mejo town?
2. What are the problems that hinders of sustainable domestic water supply in the Mejo town?
3. Is the potable domestic water supply shortage affects the household socio-economic effects in the study area?
4. What are the roles of the local government to sustain potable domestic water supply in the study area?

1.5. Significance of the Study

The study was focused on access of potable domestic water supply and its socio-economic implications in Mejo town. The significances of the study were as follows:-
In general, beneficial to the different bodies like the future researchers, for the town dwellers and for the governmental policy makers. The study is expected to generate information happening challenges that affect potable domestic water supply for the urban residents/households in the Mejo town and its adverse impacts to the town administrators. Additionally, it serves as a working document to the water sector, the Non-Governmental Organizations (NGOs), and to the community and environmental supporters to solve problems and to add valid knowledge to the existing ones. Moreover, the finding further help as source material for any further investigation to academic purposes, and contribute to enriching to existed literature and expands the existing knowledge.

1.6. Scope of the Study

The scope of the study was concentrated in depth of the status, factors of potable domestic water supply and its socio-economic effects in the area and to acquire clear of these things by providing recommendations to concerned bodies, the study was restricted geographical scope Sidama, Aroressa District Mejo town. Due to time and budget constraints, this study was limited only to Mejo town in two kebeles based on fast growing nature with inadequate water supply.

The main reasons for selecting Mejo town as a study area the problems of the potable domestic water supply faced the residents for the long period of time and it was critical and burning issues requiring urgent care in the town. However, as per investigator and information have been get there was no integrated research conducted on potable domestic water supply and its socio-economic effects of the study area. The research was accomplished within a specific short period of time.

1.7. Limitation of the Study

The obstacle of this study was the unavailability of documented data that was associated to the study and analysis of access to domestic water consumption at District level that influence the relevant information which restricted to the study. The researcher also faced the financial and time constraint. It was difficult to collect the data from the entire town population in the given period of time, so, the data was collected from only the sample. Finally, since COVID-19 virus was pandemic as declared by World Health Organization, and it was not suitable for transport and to collect full information from respondent. Even though there is unmentioned a lot of challenges, to be a fruitful in the work, the researcher tried to overcome these challenges with the great efforts.

1.8. Operational Definitions of Key Terms

The following practical terms are used in the paper as defined here under:

Access to water supply: it is an adequate amount of water which is needed to satisfy the metabolic, hygienic and domestic requirements usually about 20 liters of safe water per person per day and its source may be a public fountain or a stand pipe not more than 200 meters away from households (UN-HABITAT, 2003).

Domestic water supply: means the source and infrastructure that provides water to households and it can take different forms: a stream, a spring, a hand-dug well, a borehole with hand pump, a rainwater collection system, a piped water supply with tap stand or house connection, or water vendors (Water Aid, 2011).

Household connection/use: Household connection, is a water service pipe connected within house plumbing to one or more taps to place in the yard or plot outside the house like drinking, cooking, washing hands, body and clothes, cleaning house tools, cleaning the house, watering animals, irrigating the garden, and often for commercial activities (Chala, 2011).

Household: All persons living under one roof or occupying a separate housing unit, having either direct access to the outside (Chala, 2011).

Kebele: Is lowest administration unit in the Ethiopian government's administrational hierarchy.

Public tap or standpipe: Public tap or standpipe is a public water point from which people can collect water. Many low-income households those are unable to afford a household connection are relying on public water points (Water Aid, 2011).

Potable water: safe (drinkable) water free from harmful microorganisms and substances, even if it may have color, odor, or taste problem due to dissolved minerals (WHO, 2004).

Traditional water sources: refers any water source used by the urban people for domestic purposes that is not properly constructed by qualified people to protect from any possible contamination (Water Aid, 2011).

Water supply: Highest allowable concentration of certain contaminants in water delivered to a user of public drinking water supply (WHO, 2004).

Water vendor: Increasingly, households with a private connection are selling water to their neighbors.

1.9. Organization of the study

The final report of the study was organized in five chapters. The first chapter deals with introduction, statement of the problems, objectives of the study, research questions significance of the study, scope, limitation and key terms of the study. In the second chapter, different literature that related to the topics of the study was reviewed and presented. The third chapter presented the population and sampling procedures, data sources and data collection instruments, research method, and method of data analysis. Then, the fourth chapter discussed the results and analysis of the findings of the study. Finally, the fifth chapter provided the conclusion and recommendation for the study according to the findings.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Conceptual and Theoretical Review Literature

Water supply is one of the primary driving forces for sustainable development of any country, where its environmental, social and economic development are to a large extent dependent on improved water supply services. World urban populations, which make up to 50% of the total population on the globe, are growing approximately 5% each year. This has the potential to further stain many other burdened water systems leading to extreme water shortages worldwide (UNDP, 2006). Water is life and basic need for human being welfare. Provision of adequate and safe potable domestic water supply is a necessary point to sustainable development in both developed and developing countries (Yewondwossen, 2012).

According to Desalegn (2012) the role of potable water supply has a vital contribution upon development activities and health of the society hence, availability of drinkable water is important components in poverty alleviation. Adequate and consistent water supply is critical for surviving with every day urban life. Poor access to drinking water has negative impact on the growth. However, many urban centers around the world are facing serious problem of water supply and frequently developing countries, limited access related with poor water supply, hygiene and sanitation is widening the poverty gap, which highly affects the economic progress of towns and the health of their people. The predictable water supply provision level of Ethiopia in terms of coverage, quantity, quality and reliability is very low (Desalegn, 2015).

In the United Nations Millennium Declaration 2015 and the world summit on sustainable development, the international goals set were to reduce the proportion of people without adequate access to water and basic sanitation by one-half. In the struggle for economic and social development, the challenges being faced by many countries of the world are undoubtedly related to water. As indicated by Grey and Sadoff (2006), the interaction of water in developing world for lives of the poor communities is complex in character and operates through multiple dimensions: improved livelihoods security, increased food security, reduced health risks, reduced vulnerability, and pro-poor economic growth.

2.1.1. Sources of Potable Domestic Water

It refers to access to a variety of water sources mainly surface, underground, rainwater that are used for various domestic household purposes, like drinking, food preparation, hygiene related purposes, washing cloths and body, as well as for livestock drinking (Yitayh, 2011).

A. Surface Water

Surface water is originates from rain water. It is found non-uniformly distributed over the earth's surface. Surface water includes rivers, streams, lakes, ponds, tanks, manmade reservoirs and seawater. The quantity and quality of surface water depend upon the situations of the surface area over which it flows. It is the main source of water supply in many areas and surface water is disposed to contamination from animal and human sources. As such it is not safe for human consumption unless subjected to sanitary protection and purification before use **(**Sijbemsa, 1989 as cited in Tesfaye and Zeyede, 2004).

B. Ground Water

Ground water is the portion of the total precipitation which has penetrated downward into the permeable space in the soil and rock where it remains, or from which it finds its way out to the surface. It is water used by humans comes mainly from land such as wells, springs and it tends to be of higher microbiological quality having undergone natural soil filtration. However, it is relatively difficult to extract. Compared to other water sources more technology and energy is needed to bring water from within the earth up to the surface **(**Sijbemsa, 1989 as cited in Tesfaye and Zeyede, 2004).

C. Hand-Dug Wells

A hand-dug well can be one source of water which is one of the traditional methods for water supply system in rural and small town areas of the developing countries, and still most common. These dug wells are made by hands, therefore, there is some restriction in some circumstances, for instances, certain types of ground, such as clays, sands, gravels and mixed soils where only small boulders come across (Water Aid, 2011).

D. **Public Tap or Standpipe**

Public tap or standpipe is also public water point from which people can collect water. Many low-income households that are unable to afford a household connection are relying on public water point for their domestic purposes (Water Aid, 2011).

2.1.2. Water and its Dimensions of Sustainable Development

The outcome document of the (2012) United Nations Conference on Sustainable Development (Rio+20), The Future We Want, recognized that 'water is at the core of sustainable development' and lifeblood of the planet. It haves three social, economic and environmental dimensions and it also very important to socio-economic development (UNDESA, 2012). In reality, water supply importance has not only domestic purposes but also as strong contributions to "water as a social good" in kindness of "water as an economic good" (Bacho, 2002 and Kjellén, 2006).

2.1.2.1. Social Perspective of the Water

From a social perspective, there are obvious connections between access to safe and adequate water and health, for potable first, but also for hygiene and sanitation at the household, community and national levels (UNDESA, 2012). When there is no funding to expand water and sanitation systems, the first to suffer are the poor who live on the outskirts of the cities and in the countryside (Gulyani *et al.*, 2005). Because these communities are often unconnected to the water system, they find themselves obliged to pay high unit prices for trucked water, and to cope the lower and insufficient quantities of uncertain quality, or to see their women and children spend their time carrying water, instead of going to school or engaging in more profitable activities.

2.1.2.2. Economic Perspective of the Water

Access to safe and predictable sources of water is essential to addressing the multiple forms of deprivation related to poverty directly through drinking water and its relation to human health, but also indirectly since water is essential in most economic activity (UNWWDR, 2015).

Economically, addressing lack of safe drinking water and sanitation will lead to long-lasting effects on human capital and growth. Sustainable management of water resources and related infrastructure can greatly increase productivity in the agricultural and food sector. Achieving more efficient water use is crucial considering that production and consumption of agricultural products alone account for over 70% of water withdrawals in many developing countries (UNDESA, 2012).

Beyond the primary economic sectors, water is also important to all other economic activities, most especially through its role in energy production, mining and tourism. Considering water as an economic good relates to making the right choices about the

utilization of water in the broadest socio-economic framework. In economics efficient consumption of any good, including water, means that the value of the good for the person consuming it must exceed or at least be equal to the total cost of resources consumed in producing the item. Otherwise, it is possible to use the resources used to produce that good in another and more productive way (Hansson, 2004).

2.1.3. Approaches of Water Supply

2.1.3.1. Supply Oriented Approach

The water supply oriented approach focuses on technical elements and monopolistic public service delivery (Mani, 2000). This had failed to deliver the required levels of services and adherently resulted in the use of several alternatives to substitute and augment the piped water supply. It is now realized that the conventional "supply oriented" planning has aggravated the gaps in service delivery.

As stated by Mani (2000), supply orientation is found to be: Economically inefficient, as low-income countries find it impossible to recover the costs of large-scale piped networks, high costs are incurred in pumping and transferring water over long distances and a growing demand is created for more government subsidies. Moreover, piped services are priced well below the full costs of service provision, there by subsidizing the affluent, and leading to chronic budget deficits and dependence on external finance. Socially inequitable, as certain consumers, generally the poor and low income groups residing in the slums and urban fringe areas are excluded from the use of these services; and environmentally hazardous, as supply orientation in the water sector stresses.

Regarding this, Howe and Dixonin Mani (2000), identified donor lender and host country factors as follows: Donor-lender factors are the bias towards construction, desire to sell available technology and maximize aid flow, failure to provide training for operation and maintenance and inadequate budgets for post project evaluation; host-country factors are the desire for prestige, opportunities for corruption, lack of inputs from consumers, lack of adequate skills in the construction, operation and maintenance, lack of accountability, inefficient service charging and shortage of personnel for monitoring.

2.1.3.2. Demand Oriented Approach

According to Vairavamoorthy *et.al*, 2008 as cited in Desalegn (2012) the water demand is increasing throughout the world for different activities such as for agricultural, recreational and domestic consumptions. A water demand orientation with a focus on

service consumers' needs and willingness to pay (WTP) full costs of services, competitive markets, and broader increases social participation of the private sector, non-governmental organizations (NGOs) and community-based organizations (CBOs) is now being incorporated into water supply and sanitation strategies.

The demand orientation is potentially more economically efficient as demand oriented infrastructure delivery consists of competitive markets, and broader participation of the private sector, or water surrogates. Environmental degradation is minimized as a demand management in the water sector is valuable in ensuring that a limited supply of water distributed to match the optimal use pattern for the resources. Mani (2000) identified the significant differences between traditional systems of planning service coverage and emerging patterns of service consumption; prevailing service pricing and expenditure mandated institutional arrangements. To achieve a demand orientation, these differences need to be bridged. Planning for service coverage can be improved by considering the economic, social and environmental impacts of heterogeneous consumption along with assessing consumer needs for services.

2.2. Empirical Literature Review

2.2.1. Global Domestic Water Supply

On a worldwide basis, the amount of water for domestic use which includes drinking, cooking and sanitation are small compared with other uses because it only accounts for 10% where agriculture and industry account for about 70% and 20%, respectively. As aforementioned, the amount of water needed varies depending upon economic development. In Africa, an estimated 88% of all freshwater use is for agriculture, 7% for domestic purposes and 5% for industry. In Asia, an estimated 86% water for agriculture while industry accounts for 8% and domestic use, 6%. In Europe, most water use for industry at 54%, while agriculture accounts for 33% and domestic use 13% (UNWWDR, 2015). Global water use has increased by a factor of six over the past 100 years and continues to grow steadily at a rate of about 1% per year. Water use is expected to continue increasing at the global level, as a function of population growth, economic development and changing consumption patterns, among other factors (Wada *et al*., 2016).

According to UNWWAP (2018) the global water cycle is intensifying due to climate change, with wetter regions generally becoming wetter and drier regions becoming even

drier. At the current an estimated 3.6 billion individuals, nearly half the worldwide population animate in areas that are potentially water-scarce at least one month per year, and this population could increase to some 4.8 up to 5.7 billion by 2050.

2.2.2. Domestic Water Supply in Developing Countries

Domestic water supply functions as a basic component of welfare in its role as a direct consumer product, it also functions as an element of socio-economic infrastructure. Existence of an adequate domestic water supply is a factor of community stability than can affect the success of many of the other components of development. Financing the domestic water supply is important for livelihood of poor (Hughes *et.al*, 2009 as cited in Desalegn, 2012).

As mentioned by UNWWDR (2015) the domestic water uses for all domestic purposes which takes the form of drinking, washing, cooking, gardening, sanitation, and for restaurants. The amount of water people apply to household purposes tends to increase with rising standards of living and variations in domestic water uses. A pattern of use varies greatly from country to country, depending on levels of economic development, climate and population size.

In Africa, financing is insufficient and the institutional capacity to engage what is available is limited, most countries with in continent are falling short to sustain water sanitation and hygiene commitments, with over 80% of countries reportedly falling significantly behind the trends required to meet their defined national access targets for hygiene and drinking water. This is exacerbated by difficulties in spending the limited funds that are received (Yohannes and Mabratu, 2009). As the cause of this problem Christopher (2006) revealed that Africa's rising population is driving demand for water and accelerating the degradation of water resources in many countries on the continent.

The key water challenges related to sustainable development in Africa are water infrastructure for economic growth; managing and protecting water resources; global changes and risk management in Africa; water governance and management; financing water and sanitation sector; and education, knowledge, capacity development and water information (AU, 2014).

Additionally, domestic water access sustainability depends on sustainable water supply, local economic conditions, water availability, spatial distance, the capacity of the water supply actors for quality water supply. The human rights particularly noted that lack of

economic efficiency in water supply is a pathway to services retreat and a verge of burdening the poorest (Brown and Heller, 2017).

2.2.3. Domestic Water Supply in Sub-Saharan Africa

Water is crucial role in accomplishing the Africans development goals is widely recognized. Africa faces a situation of economic water unavailability, and current institutional, financial and human capacities for managing water are lacking. The situation is exacerbated by competition for public finding between sectors, and heavy public debt burdens in most countries. One of the critical components of the Millennium Development Goals (MDGs) is increasing access to domestic water supply coupled with improved water resource management and development in rural and urban areas (Lenton *et al*., 2008).

The proportion of the global population lacking at least basic drinking water has halved, from 19% in 2000 to 10% in 2017, and decreased in all SDG regions. In 2017, nine out of ten of the 785 million people who still used limited services, unimproved sources or surface water lived in three regions: Sub-Saharan Africa (400 million), Eastern and South-Eastern Asia (161 million), and Central and South Asia (145 million). More than half of the 144 million people who still collected water directly from rivers, lakes and ponds lived in Sub-Saharan Africa. In Sub-Saharan Africa the number of people using surface water decreased by one third, but the number using unimproved sources remained unchanged, and the number using limited services with a round trip for water collection exceeding 30 minutes more than doubled and the burden of collecting water from sources located off-premises falls primarily on women and girls (WHO and UNICEF, 2019).

As indicated by Yewondwossen. T (2012) the large numbers of countries on the continent still face huge challenges attempting to achieve United Nations water-related goals also, Sub-Saharan Africa is the world poorest and least developed region, which half its population living on less than a dollar a day. Even when opportunities exist to address outstanding water issues deep and widespread poverty across the African region constraints the ability of many cities and communities to provide proper water and sanitation services, sufficient water for economic activities and to prevent water quality from deteriorating.

As indicated by the Joint Monitoring Program (JMP) updated in 2010, water supply problem in Ethiopia, it has multiple impacts on people's health, education and nutrition,

preventing the country from reaching its development potential in general. That is, large part of the population still uses unprotected (unsafe) water sources. Consequently, related problems such as, water-borne diseases, poor sanitation and lack of hygiene still are the most common cause of illness and death and lack of water supply infrastructure such as pipe line for water.

2.2.4. Potable Domestic Water Supply in Ethiopia

Some local studies were conducted in relation to urban water supply problems in Ethiopia. Among these a study conducted Mekonnen and Uttama, 2014 as cited in Mahesh and Getu (2018) studied on potable water supply in Awaday town, Ethiopia. The study revealed that, inadequate water supply, poor standards and absence of correct allocation were caused due to high interruptions in electric power supply and administration problems. In this study, it was felt that, the causes and effects of water interruptions were necessary for a better understanding. Hence, questions were posed to get the information about this issue.

Additionally, Kebede (2015) studied on the urban water supply system in Hosanna town, Ethiopia studied on household water supply problems. The results revealed that the major factors attributed to lower supply of water were, shortage of water provision, high cost of piped water connection, rapid population growth, frequent interruption and lack of narrowing gap between communities. It was concluded that majority of the dwellers preferred to use alternative sources, which have seriously contributed to water supply problems.

According to Assefa (2006) water supply situation in Assosa town and his study was mainly focused on the causes of water problem. His findings revealed that the water supply in the town could not satisfy the consumption of the people due to increase in the number of the population of the town and weak capacity of water supply services of the town. Thus his study focused on the factors rather than the other issues to be assessed.

The other study was conducted by Mesret (2012) on assessment of drinking water quality and determinants of household portable water consumption in Sidama district, Ethiopia. His study revealed that water supply in urban areas is more or less better than rural areas. But, the water cost is considered as very high in urban area especially for the poor. In rural area, people did not use constructed water points because of inadequacy, distance,

and longer waiting times. His study was focused on the study of both urban and rural water supply schemes.

For substantial proportion of the rural population 84% of the country total in Ethiopia, the major sources of drinking water are surface run offs represented by unprotected springs, ponds, 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. The safety and quality of potable water is further in danger as the culture of open defecation has been socially accepted and widely practiced in most of the rural settings and partly in urban areas as well (Aschalew, 2009).

The provision of uncontaminated drinking water is a fundamental requirement for human consumption; to reduce water borne diseases, promote economic and social development. However, still know people lives without great success, for more than a century. The water distribution system in the Ethiopia was generally insufficient. The problem is associated partly with unfavorable topography, seasonal fluctuation of the water reservoirs, low capital investment, and lack of efficient water governance among concerned authorities (Vammen, 2012).

In addition to the above researchers, Chala (2011) studied on assessment of urban water supply and sanitation in the Ambo town. His findings revealed that the shortage of water supply, high cost of piped water consumption, and frequent interruption were the major problems in Ambo town water supply services. Moreover, of the towns but as per the researcher knowledge and also information collected from the office of the water supply and sewerage service, municipal and water mines and energy offices indicated there were that the majority of the households in the shortage of domestic water provision. Although, its cost and investigator had gave emphasis to solve the poor quality of production and quality of distribution of water supply in the town to the dwellers.

Furthermore, as indicated by Asnake (2012) studied on assessing the challenges of sustainable water supply in the Harar town. The result confirmed that water supply service couldn't cover the demand of the town with present existing capacity; all areas of the town could not get equal and proportional service and more central parts get water supplies while the peripheral areas remain without water. Additionally, the tariff set is neither affordable for the majority nor generates sufficient income to sustain the provision. The majority of victims of the problem are the poor as they cannot afford

connection charges. As a result, they are exposed to unprotected sources and buy water from vendors at high price.

2.2.5. Potable Domestic Water Supply Indicators

As clearly indicated by WHO, 2004 as cited in Kumessa (2016) the basic indicators for measuring water accessibility. These indicators show four paramount levels of water accessibility that include optimal access, intermediate access, basic access and no access. These are indicative of the level of water availability, which is a measure of the quantity available for use. Basically, they reflect the extent to which accessibility challenges such as time, distance and affordability are challenging or else.

2.2.5.1. Time and Distance Travel to Fetch Water

Time and distance traveled to fetch water are also key indicators of water accessibility. To most communities of Africa, long distance travel to fetch water is common. Hence, they spend much time and money. According to WHO 2004 standards if households travel more than 200 meters far away from house in urban, there is no access. Distance travel to fetch water is also one of the indicators of water accessibility. WHO standards in relation to time, more than 30 minutes no access 5 minutes to 30 minutes basic access and within 5 minutes intermediate access, optimal access of water supply through taps continuously and water supplied through multiple taps continuously.

Taking into account the above measurements, one billion people in the world still lack access to safe water at this time the problem is serious in Sub-Saharan Africa where only 16% of people had access to drinking water (UNWWDR, 2015).

2.2.5.2. Affordability

The affordability of water has a significant influence on the use of water and selection of water sources. Households with the lowest levels of access to safe water supply habitually pay more for their water than households connected to a piped water system. The high cost of water may force households to use small quantities of water and alternative sources of poorer quality that represent a greater risk too (Public Health Protection, 2000). Private access to tap water is the cheapest for the consumer.

Dependence on a shared standpipe increases prices almost four times. Private water delivery through tanker service (sachet or bottled water) is the most expensive and tanker

water delivery costs many times the tap water price. Thus, the consumers paying the most for water are the ones with the lowest income (Alaci and Alehegn, 2009).

2.2.6. Impacts of Urban Potable Water Supply

Since the adequate potable water supply are the primary need of human beings, inaccessibility of potable domestic water supply services have many negative impacts on people's livelihood. Among these, socio-economic, health and poor educational performance are few among the most. Safe, adequate and accessible supplies of water combined with proper sanitation are basic needs and essential components of primary health care (Mekonin, 2009). However, most of developing countries in general and Sub-Saharan countries in particular are suffering from negative social and economic out comes as result of lack of safe and adequate water supply at reasonable distance. Ethiopia is also one of the Sub-Saharan country facing similar problems.

2.2.6.1. Socio-Economic Impacts

Water supply has an important role in both social and economic development. Improved public health, better living standards and economic developments are intimately related to the availability and accessibility of adequate water supply with good quality (Yitayh, 2011). Economic growth seems to be dependent on high levels of access to safe potable water. Access to safe potable water is already beginning to decline in the emerging markets due to growing demand for supplies of an increasingly infrequent resource. However, the quality of potable domestic water is in decline in many parts of the world, and increasing socio-economic barriers, such as rising water prices, mean that fewer people have access to safe drinking water (The Pacific Institute, 2009).

Water insufficiency can also lead to economic losses especially in Asia, Southern Africa and the Middle East due to water-related hazards, which have risen greatly in the last decade (UNWWDR, 2015). Water inaccessibility also brings additional costs on residents because of failure of plumbing and increased costs of water for example through purchasing bottled water (The Pacific Institute, 2009).

In line with water affects the economy of a country in many respects. Rivers and streams are used for transportation, acid rain leads to forest damages and health problems caused by water pollution not only reduce the quality of life but also entail economic costs (SIWI, 2005 and UNEP, 2004). Water inaccessibility creates financial losses due to disturbance of operations: increased financial investments due to required water

treatment, either for water use, or wastewater treatment; loss of an anticipated revenue base due to cancelled or delayed growth and expansion in a region due to quality, quantity, or stakeholder considerations (WWF, 2010). Overall water inaccessibility affects all social and economic sectors and threatens the sustainability of the natural resources base.

As indicated by Alaci and Alehegn (2009), poor access to water supply and sanitation limits opportunities to escape poverty and exacerbates the problems of vulnerable and marginalized groups especially those affected by HIV/AIDS and other diseases. According to Ethiopian Ministry of Health (2005), the well-known negative synergy of diarrheal disease, malnutrition and opportunistic infections are known to have short-term health impacts and long term debilitating effects. In the long term, child development is impaired resulting in growth retardation and diminished learning abilities. It is estimated that 4 in 10 children will not realize their educational potential which ultimately inhibits socio-economic development. In addition there is a potential productive time lost to illness caring for the sick and attending clinics. There are also the financial costs of treatment for medicines and clinic attendance.

Poor educational performance was according to the Federal Democratic Republic of Ethiopia National Hygiene and Sanitation Strategy of (MoH, 2005); Ministry of Health 2005 as well as the diminished learning abilities mentioned above, it is widely believed that a significant number of school days are lost due to diarrhea. This mainly affects girls who end up staying at home to care for siblings. Therefore, poor health robs the children of schooling and the adults of earning power, a situation aggravated for the women and girls by the daily chore of collecting water. For a family of six, collecting enough water for drinking, cooking and basic hygiene means carrying heavy water containers from a distant source for an average of three hours a day. All in all, the lack of water and sanitation affects every aspect of the family's life, and condemns people to a perpetual struggle to survive at subsistence level (WHO-UNICF, 2005).

2.2.7. Challenges of Potable Domestic Water Supply

In the provision of adequate potable water and sanitation facilities to urban dwellers, the world faced many challenges, which are related to capacity of the nations that is technological knowhow and institutional, inadequate finance, rapid urbanization and declining of global water resource. The major challenges of urban water supply systems

in developing countries are low water supply service coverage, unavailability of sufficient water at all times, very high amount of water loss which ranges up to 50% of amount of water produced and absence of quality water which meets national or international drinking water standards (Desalegn, 2015).

2.2.7.1. Lack of Capacity

According to Wallace *et al*., (2008) capacity is a flexible concept and encompasses the public sector, academia; community based organizations and the private sectors, and ranges from the individual to institutions to society as a whole. Capacity can be described in terms of the human, technological, infrastructural, institutional and managerial resources required at all levels from the individual through to national governance. Not only does capacity have to be built within each of these levels, but it has to be institutionalized and local communities need to be empowered to use it effectively.

In generally, in developing countries more affected by lack of capacity to provide effective potable water allocation due to technical, financial, and administrative capacity to address these issues whereas developed countries have greater opportunities do to this. Even if there is a capacity to develop regulatory frameworks, many of the countries in these regions lack the capacity to implement and enforce regulation concerning water management issues (UNEP, 2004).

2.2.7.2. Technological Capacity

According to MoFED and UNDP (2005) innovative technologies are essential to overcome barriers to water and sanitation service provision. Technological capacity includes the development and application of new technologies, the technical skills needed to effectively construct, operate and manage a technical solution; the translation of information regarding technologies to promote informed decision-making when implementing a technical solution; the availability and accessibility of spare parts. Thus, most systems and facilities of water supply are poorly constructed, designed and utilize technologies that are not appropriate.

2.2.7.3. Lack of Institutional Capacity

Leaders of most developing countries lack strong organizational framework, and good governances that result in weak policy environment for water supply and sanitation sector. Underinvestment, undefined ownership, poor participation, weak regulations, and conflict priorities are the outcomes of weak policies (Yitayh, 2011). Institutional issues of

urban water supply are raised by WSP (2009) in such a way that the poor performance of water supply and sanitation services is often due to an inappropriate institutional framework, lack of regulatory mechanisms, an absence of appropriate attitudes and skills, and a lack of explicit directives and incentives to serve the poor.

Given the rapid pace of urbanization, the institutional capacity of local and national governments and water utilities to increase investments and manage the delivery of services is becoming critical, especially in cities with old and poorly maintained water and sanitation infrastructure and cities in the developing world. High rates of unaccounted for water (mainly due to leakages), unsustainable tariffs and weak systems of governance are typical manifestations of the growing capacity gaps in many urban areas (UNWWDR, 2015).

2.2.7.4. Inadequate Financing

Historically, water and sanitation has suffered from severe under financing. These results from inadequate internal financial capacity in the poor countries to achieve water and sanitation goals; poor political decisions for allocation of development aid; an overall reduction over time in development aid; and the limited cost recovery potential in poverty troubled regions (Wallace *et al.*, 2008).

In most countries, funding for water infrastructure comes from government allocations, although many developing countries still depend on external assistance to fund water resources management and utilities. This is neither adequate, nor sustainable. Most countries report that information required for adequate financial planning in the water services sector, such as information on users and their potential contributions, is insufficient. Costs of infrastructure operation and maintenance are often neglected or not well factored into water mobilization projects. As a result, many water systems are inadequately maintained, leading to damages, losses, unreliability, and decreasing quality and quantity of service to users. Financing is reported to be particularly inadequate for sanitation, with drinking water absorbing the majority of funding available particularly in developing countries (WHO, 2012).

Financing for wastewater treatment is chronically neglected (UNWWDR, 2015). In additionally, poor targeting of aid and a multiplicity of actors and structures compound the financial shortfall. Wallace *et al*., (2008) also stated that to ensure that resources for

safe water and sanitation are used effectively at the local level, the local capacities to design, finance and manage improved service delivery must be greatly enhanced.

2.2.7.5. Population Growth and Urbanization

Population growth and rapid urbanization will create a severe scarcity of potable water as well as tremendous impact on the natural environment. In less developed countries, urban population will grow from 1.9 billion in 2000 to 3.9 billion in 2030, averaging 2.3% per year. Besides having less or not invested in urban infrastructure, Africa is urbanizing faster than any other region. Between 1990 and 2025, the total urban population is expected to grow from 300 to 700 million; and by 2020, it is expected that over 50% of the population in African countries will reside in urban areas. Political commitment to these goals, backed by resources and action is essential if utilities are to prevent a widening of the gap between 'saved' and 'unsaved' households (UNPP, 2006).

Furthermore, Documented by World Bank Regional Reports Africa Region Henry (2007) stated that there is a linkage between rapid population growth and urbanization on one side and lack of access to potable water on the other side. The situation is worse in Sub-Saharan Africa, where urbanization is happening most rapidly. In this region, the percentage of people who enjoyed piped water on their premises, which is the preferred option for urban areas, actually decreased from 42% to 34% (WHO-UNICEF, 2014). This clearly indicates that access to 'safe' drinking water sources continues to be a major problem in cities in the developing world.

2.2.8. Water Supply Policy and Goals in Ethiopia

As mentioned by Awulachew *et al*., (2007), there are 12 river basins in Ethiopia with an annual runoff volume of 122 m^3 of water and an estimated 2.6-6.5 billion m^3 of groundwater potential. Hence, there is practically large volume of water available per person per year which corresponds to an average of 1575 m^3 of water. Nevertheless, as mentioned above, due to country terrain and topography along with difference in spatial and temporal variations in rainfall and lack of storage, water is not easily accessible where and when needed. Out of total water potential, only 3% of water resources have been used, of which only about 11% (0.3% of the total) has been used for domestic purposes. So, to solve this water problems the water supply and sanitation policy began in Ethiopia in the mid of 1988. At that time the general policy of the government was to

provide water and sanitation through its own public water sector institution with the supply side approach.

Therefore, water supply and sanitation policy is an integral part of the country's water management policy. In relation to the policy document (1999), the policy is believed to provide and impetus for the development of water supply for human and animal consumption. It focuses on increasing the coverage, quantity, reliability and acceptable quality, taking the existing and future realities of the country into consideration.

Since 1999 Ethiopian Water Resources Management Policy (EWRMP) was enacted. The overall goals of the (EWRMP) and the Water Sector Strategy (2001) are to promote national efforts towards efficient, equitable and optimum utilization of the available water resources of Ethiopia in order to alleviate the problem of potable water supply access and to achieve significant socio-economic development on sustainability bases of the country through better health care and productivity of its people (EWRMP, 1999).

According to EWRMP (1999), detail policy issues described for potable water supply encompasses user participation, engineering issues, finance and tariff, research and technical issues, and enabling environment. WHO-UNICEF/JMP report of 2015 indicates that the improved water coverage in Ethiopia was found to be 93 and 49% in urban and rural areas, respectively. The country coverage of improved water source usage reached 57%. On the other hand, 30% of the total Ethiopian citizens rely on unimproved drinking water sources.

Drinking water is one of the indispensable human rights and governments have a duty to make their citizens water secure. These duties have different care components constituting water security right to sufficient, safe, physically accessible, affordable and acceptable water for personal and household uses (Yitayh, 2011).

Early research works concluded that accesses to water in terms of quality and quantity for domestic needs are the indicators for poverty alleviation. However, still the potable domestic water supply is uncovered phenomena in all urban as well as rural areas in Ethiopia (Dr. Mahesh and Getu, 2018).

2.3. Conceptual Framework

In general, understanding and measuring the sustainability of water supply is difficult. Consequently, from the literature review, the researcher was summarized the following basic elements and formulated a conceptual framework as shown in Figure below;

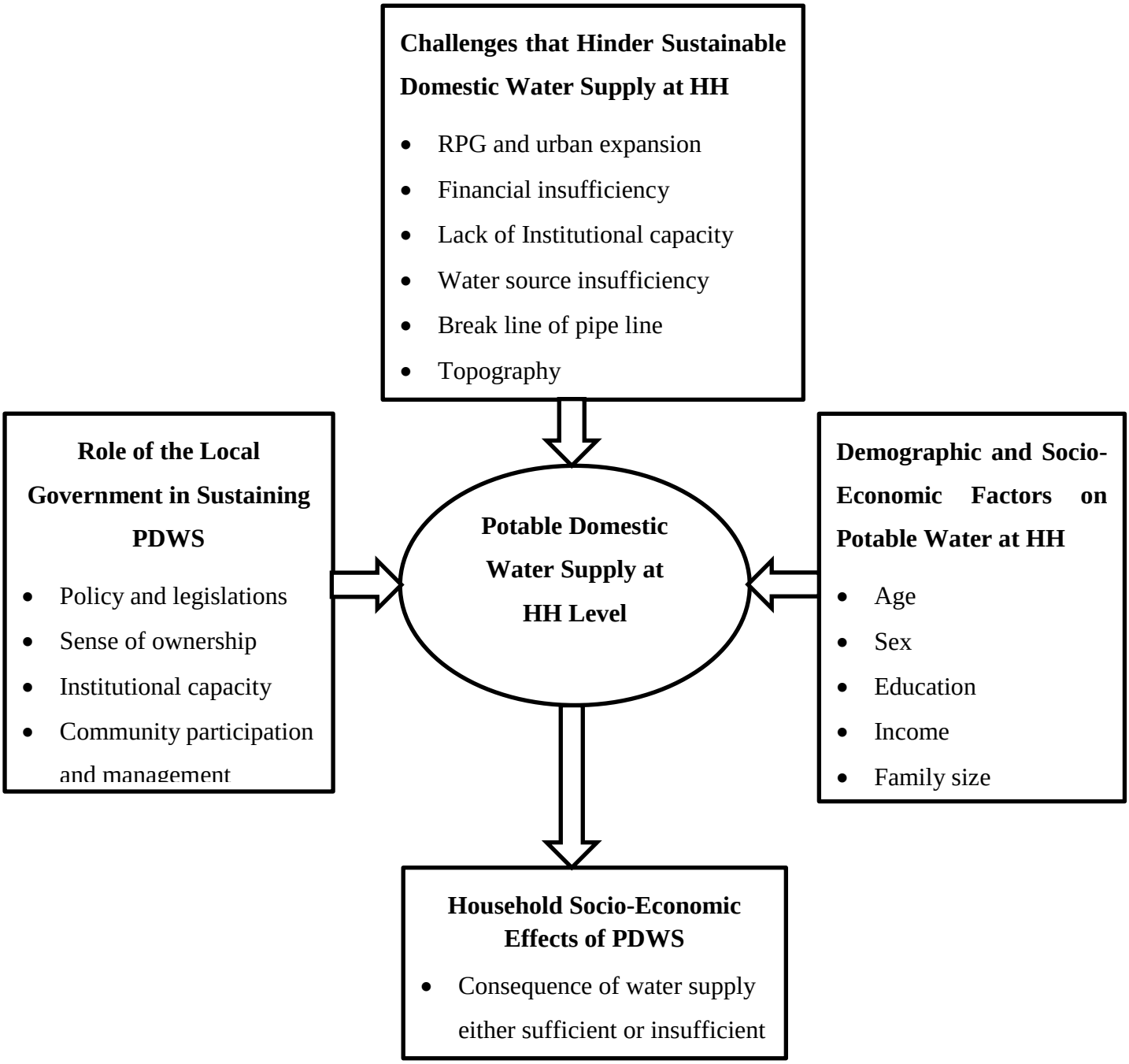

Figure 2:1: Conceptual framework

Source: Constructed by the author, 2020

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

3.1.1. Location of the Study Area

This study was conducted Mejo town in Aroressa district, which is found in Sidama, Southern Ethiopia. It was located at 457 km South of Addis Ababa and 182 km far from Hawassa to the South east. Currently Mejo town serves as administrative capital town of Aroressa district and rural kebeles of the district. Its geographical location of Mejo town lies between Latitude $6^0$21'0"-$6^0$23'0" N and Longitude $38^0$56'0"-$38^0$58'0" E and the town was bounded from the East by Chicho Oddessa, West by Melkadintu, North by Bube Bore and South by Butaro kebeles and the town has covers the total area of 808.641 hectares from the district (ADRADO, 2019).

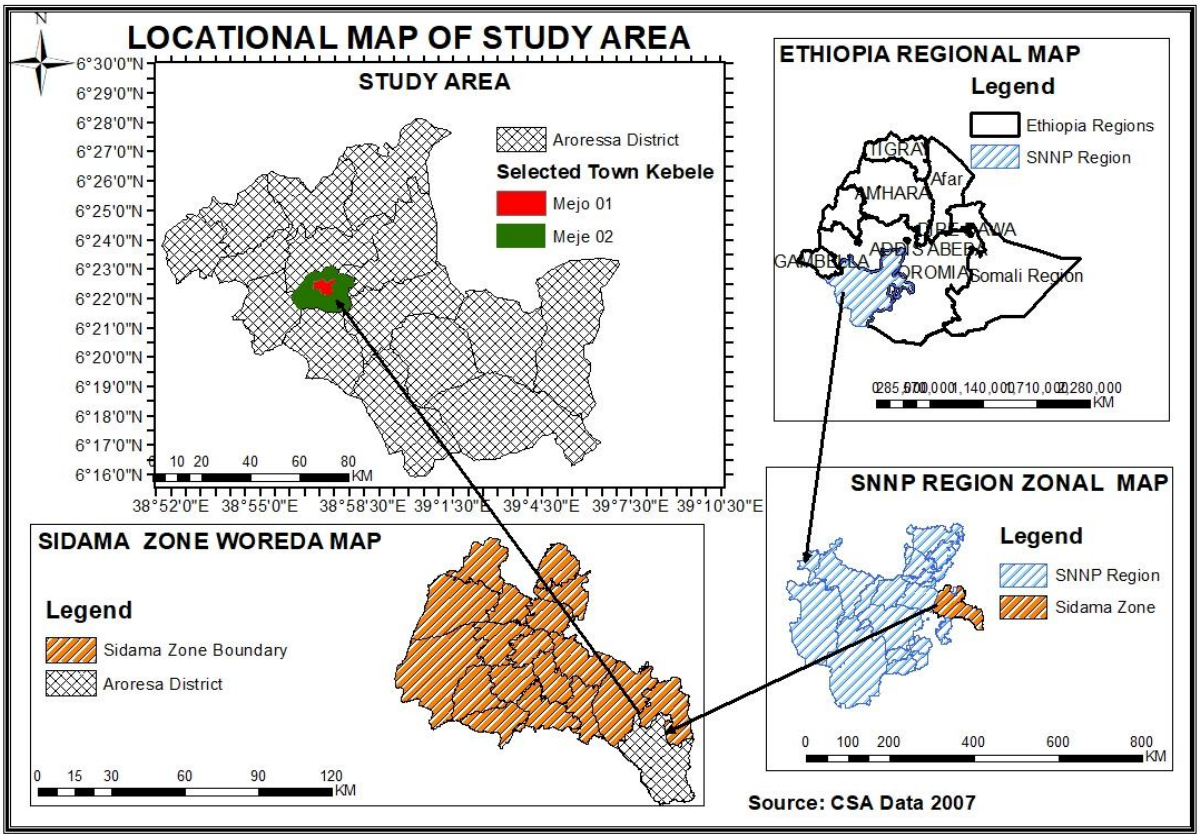

Figure 3:1: Location Map of the study area

Source: CSA Data, 2007

3.1.2. Climate of the Town

Concerning the climate conditions of Mejo town, there is no reliable meteorological data. However, the several distributed data reveals that the town experiences a Dega climate with mean annual rain fall of 1030 mm and the mean annual temperature lies between 17.6-26.5°C this also confirmed by the fact that as with altitude between 1700-1900 and 2400-2600 meters above mean sea level in Ethiopia are consider as Dega/tropical, Mejo town has an average altitude of 2200 meters above mean sea level (ADRADO, 2019).

3.2. Research Design

In this research, the descriptive survey design was employed. According to Abraham and Solomon (2016) descriptive survey research design that explains and interprets conditions of the present and examines a given phenomenon that is occurring at a specific place and time. Therefore, the study applied a cross-sectional survey that was intended to the existing phenomena of the potable water supply at Mejo town and it was widely applied in the discipline of social sciences when gathering detailed data from large population under study at particular time.

The researcher used mixed research approach to maintain triangulation in its findings, and to address the stated objectives. The researcher used both qualitative and quantitative types together to collect and analyze the data simultaneously to enhance understanding. Quantitative type it involves potable domestic water supply and its socio-economic consequences at household's level through survey questionnaires by using numerical interpretations and qualitative employed different data gathering from key informant interviews and focus group discussions by narration.

3.3. Population, Sampling Technique and Sample Size Determination

3.3.1. Study Population

According to CSA (2007), the Mejo town had 2,979 total populations out of which 1,516 were male and 1,463 were female. Currently, Mejo Municipality Annual report indicates that the total population of Mejo town is 12, 281 out of which 6, 211 were male and 6, 070 were females. The total number of households' in the town is 1, 427 households with an average town family size of seven persons per houses (ADMM, 2019). Burns and Grove (2003) describe population as all the elements that meet the criteria for inclusion in

a study. Target population of this study was the urban dwellers of Mejo town, whereas study units were households which currently were randomly selected from two selected kebeles of Aroressa District.

3.4.2 Sampling Techniques

In this research, multi stage sampling techniques were employed. Firstly, the district was selected purposively because the researcher is familiar with the study area and from the researcher preliminary observation portable domestic water supply access is a poor in the town. Secondly, the study town has two kebeles, Mejo 01 and Mejo 02 both are included in the study due to the both kebeles were affected by potable domestic water shortages and they have similar characteristics of agro-ecology and living standards except the number of population and demarked year as a town kebeles. In this regard, the researcher included all the kebeles found in the town.

Thirdly, from these two kebeles the researcher was selected sample households by systematic random sampling technique used to select the representative sample from total population under study area and from the total household dwellers of the Mejo town for this study that is why without using sampling it might been difficult to incorporate the all population, where the total amount were very large would been impossible.

In addition, purposive (non-probability) sampling techniques were adopted to select samples from different concerning bodies like key informant interviews (KIIs), focus group discussions (FGDs) and field observations were purposefully select to gather qualitative data for the research issues and to articulate the data.

3.4.3 Sample Size Determination

To determine the households sample size for this research study the Yamane (1967:886) formula was employed as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where n =is the sample size,

N= is population size and

e =is the level of precision or degree of variability

In this study, the researcher was employed error of margin equals 5%, that is, e= 0.05. The sample size by convention is set at 0.05 value of error for most research with 95% of confidence level.

From this case $n=\frac{1,427}{1+1,427(0.05)2}$ $n \approx 312$

The proportion of the unit sample for each kebele depends on the total household population size in the study area and to require sample households of each kebele researcher used proportional formula as stated below;

$n_1=\frac{N1(n)}{\sum N}$

Where: n_1= distribution of sample size households of each kebele,

N1= household size of each kebele of a given area, n= total sample size of the study HHSs population, $\sum N$=Total household heads of the two sampled kebeles.

In total, among 1,427 household heads in the town 312 sample households were selected out from two kebeles by using above mentioned proportional formula.

Table 3:1: Distribution of sample households from each sample kebeles

Nº	**Name of Kebeles**	**Sampled kebeles**	**Sample distribution**	
	Selected kebeles	Total households of each kebele	Sampling formula of total sample households	Number of the Sampled households
1	Mejo 01	M = 487 F = 319 Total = 806	$\frac{806(312)}{1,427}$=176	176
2	Mejo 02	M = 393 F = 228 Total = 621	$\frac{621(312)}{1,427}$=136	136
Total		1,427	312	312

Source: The researcher own survey, 2019

In this study, a total of 176 and 136 households from each two kebeles (Mejo 01 and Mejo 02) were selected, respectively. Therefore, the total sample size was 312 households. After having decided on the sample size, households were selected randomly from each two kebeles based on sampling frames prepared from the housing available at the town administrative office. Eight (8) Key informant participants were selected by non-probabilistic purposive sampling method selected from different offices such as;

Water, Mines and Energy Offices, Mejo Town Municipal Offices, Health Offices, and two town kebele administrations.

Table 3:2: Selection of respondents for interview

No	Offices from where the KIIs were selected	Numbers of selected key informants	Method of section
1	Water, Mines and Energy Offices	2	Purposively sampling
2	Mejo Municipal Offices,	2	Purposively sampling
3	Health Offices	2	Purposively sampling
4	Two town kebele administrations	2	Purposively sampling
	Total	8	

Key Informant Interviews

3.4. Sources of Data

As stated by Yin (2014) mentioned, data and information are a source of evidence for the study of the research. In this study a researcher used both primary and secondary data sources. Primary data was collected from selected kebeles of the sampled individual households about access of potable domestic water supply and its socio-economic implications; by using survey questionnaires, key informant interviews, focus group discussions (FGDs) and based on the nature of the data; the researcher conducted the field observation to get necessary information from the study area.

Secondary data was collected from published and unpublished documents, internet sources, reports, journals, magazines, books, standard documents, statically information and other related material collected from different sources. This was helps to review the overall access of potable domestic water supply and its socio-economic situation in the study area.

3.5. Data Collection Instruments

To obtain sufficient information from the selected sources, different data collection tools and methods were employed which are questionnaires, key informant interviews, Focus group discussions and personal observation. Where, the questionnaires were the major tools of data collection for the study was employed and the others are methods were

employed to make stronger or fill the gap that might see the data collected by survey questionnaires.

3.5.1. Survey Questionnaire

In the study the researcher was employed both close-ended and open-ended questions to gather information from the respondents about accessibility of potable domestic water supply. In order to gather the appropriate information about the problems under study, questionnaire was distributed for selected household respondents on the potable domestic water supply and its effect on socio-economic situations, adequacy, accessibility, and to close the gap about water supply provisions of the town.

The questionnaires were first prepared in English and then translated in to local language (Sidamgna). This helps for clarity, acceptability, flow and to reduce repetition. The bases for the preparation of final questionnaires were the pilot survey undertaken including ten (10) households from the two kebeles. The pre-testing of the questionnaire actually helped in the administration and implementation of the actual survey and in restructuring the questionnaire format and content.

In order to facilitate the survey work, three field assistants were trained from the study area based on two criteria; education and experience. These three field assistants were trained for one day by the principal researcher as an enumerator to collected data through the questionnaire. In order to maintain the quality of data collected, meetings detained or held with field assistants at the end of each survey date to discuss problems faced.

3.5.2. Key Informant Interviews (KIIs)

Key informant interviews method was carried out by using purposely sampling techniques through selecting knowledgeable and experience-rich-experts from different organizations and institutions. Accordingly, eight (8) key informant participants were selected from different office heads/experts/professionals such as; Water, Mines and Energy Offices two, Mejo Town Municipal Offices two, Health Offices two, and two town kebele administrations two.

Semi-structured interview was posed to the selected officers for interviews and discussing with them straightly face to face contact. The reason behind using a semi-structured

interview was advantages of flexibility in which new questions remained forwarded during the interview based on the responses of the interview. The interview about the town facilities like water supply, health condition that related with water particularly accessibility, affordability, water status and adequacy to identify the condition in the town. The interview was conducted in Sidamgna language to avoid language barrier and support by audio recorders in order to minimize loses of audio information. This is helped the investigator to acquire relevant and more reliable information.

3.5.3. Focus Group Discussion (FGDs)

A focus group discussion method helps to generate data on group dynamics, and allows a small group respondents were guided by the researcher to focus on key issues of the research topic. And, at each kebele, one focus group discussion was held with only focused on (town dwellers, elders, religious persons). Similarly, focus group discussions (FGDs) with selected five men's and three women's group was conducted separately with members comprising eight (8) individuals by using purposely sampling techniques. The group was formed on volunteer basis with the help of the kebele manager in the respective sample kebeles experience related to the issues being discussed.

The researcher before conducting focus group discussions, a guideline/checklist was prepared according to the situation of the study area in advance. Focus group discussion aimed to produce different thinking and understandings on various potable domestic water supplies and its socio-economic implications for the town dwellers.

3.5.4. Field Observation

The participatory observation was enables the researcher to observe and discuss with the selected groups on the matter by preparing checklists. Consequently, the researcher used field observation methods to the necessity of becoming part of the selected group and observes how they get water; fetch water; current status of water and asking clarification on their actions in the Mejo town. As the same way, observation was practiced by the investigator in order to obtain further or additional information to validate the information from the scheduled interview.

3.6. Methods of Data Analysis

The data was collected from both primary and secondary sources were ordered, presented, analyzed via quantitative and qualitative method of data analysis by using descriptive statistics. Quantitative data from the survey questionnaire were analyzed by using the Statistical package for social science (SPSS) V23, Microsoft excel, and presented using the descriptive statistics like frequency tables, percentage, mean and standard deviation; pie-charts, bar graphs and t test and ANOVA test.

The qualitative data was obtained from key informant interviews, focus group discussions and field observation, then it was analyzed thematically, based on common perceptions and similar opinion was analyzed through interpretative analysis focusing on providing meanings and explanations to the awareness of the informants so as to dig out issues under investigation to triangulate the quantitative finding by narration.

3.7. Reliability Test on the Perceptions

Reliability is the degree to which the measurement measure consistently similar thing. There were many ways of testing reliability, from these the internal consistency measure was the most common and measured using the Cronbach's alpha coefficient. Internal consistency reliability refers to the extent to which items in an instrument are consistent among themselves and with the overall instrument (Gay, *et al.*, 2006). Additional, if a multiple items construct measure is administered to respondents, the extent to which respondents rate those items in a similar manner is a reflection of internal consistency, and this reliability can be estimated in terms of Cronbach's Alpha (Bhattacherjee, 2012).

Moreover, according to the Hinton *et al*., (2004), stated that a reliability score which includes excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70) and low reliability (0.50 and below). In this research, Cronbach's Alpha value was used to measure internal consistency of items in five Likert scales questions on challenges and reasons of the sustainable potable water supply problems, social related impacts and economic related impacts. The overall 20 items were for the entire variables, based on the scale items, the overall reliability of the Cronbach's Alpha were 0.738 that was high reliability level according to a criterion set by (Hinton *et al*., 2004).

Table 3:3: Reliability test

S. N^{o}	Items	N. items	Alpha value
1	Challenges and reasons the of sustainable potable water supply	10	0. 727
2	Social Related Impacts	6	0.734
3	Economic Related Impacts	4	0.740

Source: SPSS Output, 2020

Since, the instruments were found to be valid and reliable; no changes were made; therefore the same instruments were used for final study.

3.8. Validity Test

Validity refers to the extent to which a measure adequately represents the underlying construct that it is supposed to measure (Bhatteheriee, 2012). The validity of the questioner was checked by the thesis advisors and colleagues of experts from government organization and made some wording adjustment. All comments incorporated and modifications were made before actual implementation of the tools.

3.9. Ethical Considerations

The observation of the ethical issues in the field made this study successful. According to Louis Cohen *et al*., (2007) have remarked that in research full attention should be given for moral and ethical issues. Therefore, the researcher was attempt to establish good relationship with all the interviewees by making himself clear; where he comes from, why he decided to conduct the research, why he choose the focus group discussions (FGDs) method for the study and giving respect to the cultures of the people in these communities throughout the research process time.

The researcher also was arranged discussion time without affecting each informant. In similar way the researcher was makes himself clear to the town household's respondent and institutional administrators. Before the beginning of the interview the researcher was enquired the permission from the respondents, key informants and Focus group discussion to conduct interview with them on the access of potable domestic water supply and its socio-economic consequences in the Mejo town.

CHAPTER FOUR

4. RESULT AND DISCUSSION

This part presents the result and discussion of the study in detail to address the objectives of the research. The chapter is divided into five major sub-sections. These are description of socio-demographic and socio-economic characteristics of the study participants, the current situations of potable domestic water supply in the area, challenges of sustainable potable domestic water supply in the area, impacts of the potable domestic water supply shortages on the household socio-economic consequences in the area, and roles of the local government to sustain potable domestic water supply in the study area.

To achieve the objective of the research, 312 survey questionnaires were prepared to gather data from the study area. Before starting data entry, all the questionnaires were re-checked for their completeness and incomplete responses were taken back for clarification. Further, to have a clear consistency of the response, the researcher was used guided interview with selected work process expert and officials. For this study, all the collected questionnaires are utilized for detail analysis.

4.1. Response Rate

The researcher made every effort to reach all of the respondents of town resident's household on potable domestic water supply and its socio-economic implications in Mejo town Aroressa District. As stated under methodology, a total of 312 copies of survey questionnaires were distributed. However, only 297 of them responded as indicated in table below depicting a response rate of 95.1% while 4.9% of the respondent did not respond due to they could be absent from the workplace (**Table 4.1**).

Though acceptable response rates vary by how the survey is administered Jack (2014), argues that the response rates approximating 60% for most research should be the goal of researchers. Based on these statements from popular scholars return rate of 95.1% (297) is very good for the study. The response rate of this study is higher than the average rate of academic surveys' done among organizations. Hence, it is an acceptable response rate and very a good return performance.

Table 4:1: Response Rate

Category/Response	Frequency	Respondents Rate Percentage
Responded	297	95.1%
Did not responded	15	4.9%
Total	312	100%

Source: Survey data, 2020

4.2. Socio-demographic and Socio-economic characteristics of study participants

In this section an attempt is made to present and discuss the demographic and socio-economic characteristics of the study participants. Under this sub section, the age of household head, sex of household head, marital status, educational status of household head, monthly income, occupation, family size and lived years were presented and discussed in detail.

4.2.1. Age and Sex of Respondents

The mean age of respondents was 44.7(±11.4SD) years with a minimum and maximum age of 20 and 70 years. In addition, when the age of respondents categorized, about 36(12.1%) were between 20 and 30 years, 69(23.2%) were between 31 and 40 years, 104(35.0%) were between 41 and 50 years, 61(20.5%) were between 51 and 60 years and finally 27(9.1%) were above 61 years. Here, most of the respondents belong to the age group of 41 to 50 years (**Table 4.2**).

The statistical association between the type of potable water supply and the age of households was assessed using the ANOVA test and it was found that as there was no statistically significant difference among the age category in potable domestic water consumption ($F(4, 292) = 2.09$, p-value = 0.08). This was supported by the study conducted in Bomet municipality, Kenya, (Koskei, 2013). This shows that age of household heads do not affect the potable water supply at household level.

Table 4:2: Age of respondents in the Mejo town

S. No	Variables	Frequency	Percentage
1	Age category of respondents in years		
	20-30	36	12.1
	31-40	69	23.2
	41-50	104	35.0
	51-60	61	20.5
	Above 61	27	9.1
	Total	297	100.0

Source: Survey data, 2020

Concerning the sex of respondents, 137(46.1%) about were male households, while 160(53.9%) were female households (**Figure 4.1**). In this specific study, proportion of female households dominates the male headed ones. This indicates, females are important for household water fetching daily and they are more likely to be aware of water supply either at household level or town level. However, the discussion from focus group indicates that male also in the town had understanding about water supply problems since they pay money either for vendors or water service for the water, mines and energy office. Therefore, even if the males' participation was small, they are important in household water supply.

Regarding the association between the potable domestic water supply and sex of household head, t test was done to assess the statistical difference in water consumption between the sex of respondents and it was found that sex of household head had no significant association with the potable domestic water supply ($t = 0.455$, p-value = 0.65). This shows that water was used by households was not influenced by the sex of household head. This finding was supported by the study conducted in Kenya, Bomet Municipality, where the gender of household head had no significant association with type of water source (Koskei, *et al., 2013).*

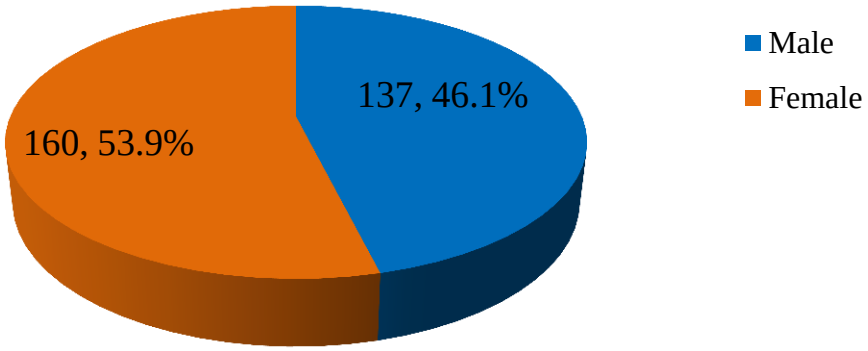

Figure 4:1: Showing the sex of respondents in the study area

Source: Survey data, 2020

4.2.2. Educational level, marital status and family size of respondents

Education is an instrument used to create educated citizens who works for the socio-economic development of a nation. It is a basic parameter for any development activity as in water supply and distribution programs. This is because literate citizens can be better participants and involve in projects targeted to water supply and distribution. Knowledge and technology transfer are also easier in a community that constitutes educated peoples. Educated individuals demand for better services and toward improvement of their living condition.

According to this study, about 13(4.4%) participants reported that as they had not educated, 30(10.1%) stated that as they had attended primary school (1-6), 52(17.5%) informed that as they had attended junior school (7-8), 101(34.0%) described that as they had attended high school, 63(21.2%) recounted that as they had completed certificate or diploma, 39(12.8%) complete the degree and above (**Table 4.3**). Here, the proportion of those who described as they have completed the high school dominate the others showing that most of the study participants have attained an educational level that help them to decide over their household on the type of water for household consumption.

Then, the presence of statically significant difference among the different levels of educational status and household water consumption was assessed using the ANOVA test and it was found that there was no statistically significant difference ($F(5, 291) = 1.53$, p-value = 0.18). However, according to the study conducted in Kenya on the assessment of association between educational status of household head and water consumption, it was found that educational status of household head has associated with income and economic

status of households in many studies and it showed that household heads with lower educational status are more likely to use unimproved water for household consumption, since they may have lower income thereby unable to fulfill the improved water demand (Koskei *et al*,. 2013).

Concerning the marital status, about 26(8.8%) were single, 206(69.4%) were married, 40(13.5%) were divorced, and 25(8.4%) were widowed (**Table 4.3**). In this specific study sample, those who were married proportional dominate the others showing most of the study participants were married. Hence, selected participants regarding of marriage status they understood problems of potable domestic water supply and its related issues in detail and gave expected data for this study.

Table 4:3: Education and Marital status of respondents in the study area

S. No	Variables	Frequency	Percentage
1	Education level of household head		
	Not educated	13	4.4
	Primary school (1-6)	30	10.1
	Junior school (7-8)	52	17.5
	High school(9-12)	101	34
	Certificate/ Diploma	63	21.2
	Degree and above	38	12.8
	Total	297	100
2	Marital status of household head		
	Single	26	8.8
	Married	206	69.4
	Divorced	40	13.5
	Widowed	25	8.4
	Total	297	100.0

Source: Survey data, 2020

Regarding the family size of households, about 177(59.6%) households have a family size of 6-10, 93(31.3%) households have a family size of 1-5, and 27(9.1%) households have a family size of 11-15. In addition, the mean family size was 6.9(±2.6SD), with the minimum and maximum family size of 1 and 15 respectively (**Figure 4.2**). Here, those households proportional who hold the family size of 6 to 10 family size dominate the

others. This indicates that as the household size shows the increased need for more water supplies, which in turn put the family in strain.

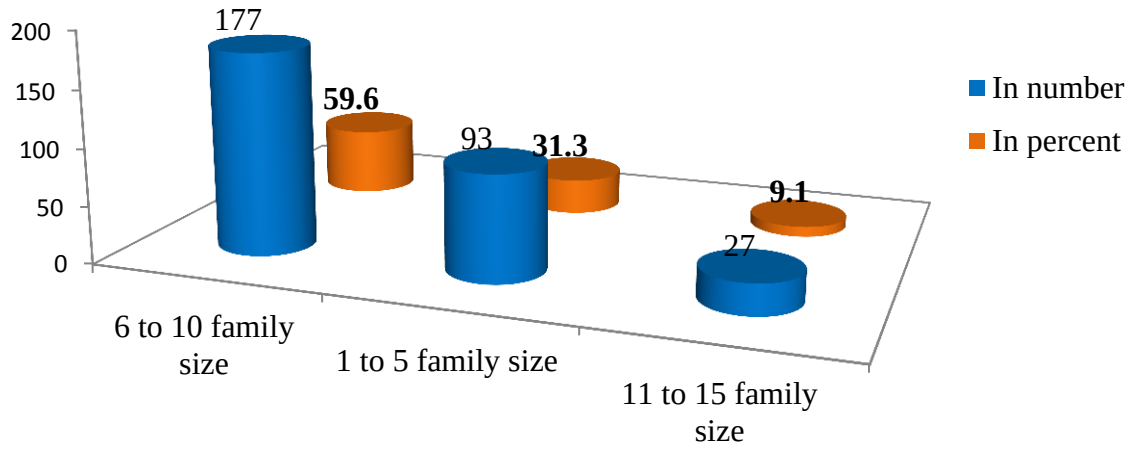

Figure 4:2: Showing the family size of respondents in the study area

Source: Survey data, 2020

4.2.3. Occupational status, monthly income and number of years lived in the study area

Regarding the occupational status of the respondent, about 50(16.8%) reported that as they are farmers, 123(41.4%) stated that as they are business men, 92(31.0%) testified that as they are government employee, 25(8.4%) reported that as they are daily laborer, and 7(2.4%) stated that as they are others (**Table 4.4**). Here, the result shows that business man proportional dominates the others. This shows that most of the residents in town were business man, and followed by those who reported that as they are government employee. In study area, the business man is more likely to use huge amount of water for their various business purposes like; restaurants and cafés. The study conducted in Bomet municipality in Kenya showed that there was statistically significant association between the occupation of household head and the domestic water source.

This tell us that people who earn good can access and utilize potable water for domestic purposes, either near or far. However, if the household's earn was poor, they cannot access and utilize water as needed for household consumption. This is because of poor households might not have private pipeline or other source of water of their own, or resources to buy safe water or treat unsafe water. In addition, the occupation determines the income, which in turn has influence on amount of funds to spend in water. People

may become ‘water poor’ regardless of availability of safe water in their area, because of they are income poor (Lawrence *et al.*, 2002).

Regarding the monthly income of respondents, about 100(33.7%) stated as they earn 100 to 1200 ETB per month, 69(23.2%) specified as they earn 1201 to 2400ETB, 74(24.9%) indicated that as they earn monthly income of 2401 to 3600ETB, and finally, 34(11.4%) testified as they earn monthly income of 3601 to 4800ETB. In addition, the mean monthly income of respondents was 2262.2(±1487SD) with a minimum and maximum income of 100 ETB and 6000ETB (**Table 4.4**). In this specific study, this shows that the proportion of those who reported as they earn 100 to 1200ETB dominate the others. This indicates that the average monthly income of most of the households among the town residents was lower than one dollar per day per person, which in turn put them at risk of not getting potable water for drinking because of inability to buy even the water that is available in their vicinity.

In addition, there is large variation in the amount of monthly income between the highest and lowest. It is clear that households with low income are unable to fulfill their basic requirements including access to potable water and food because they are less likely to access pipe water and plough their land and buy the improved seed, so that they rent it to someone.

Since, whether public tap or other form of water source, income is very important determinant of household capacity to buy potable water for domestic purpose, because people who do not have enough income to buy water, redirect their available income for more immediate need and depend on limited household water consumption thereby exposing themselves for different types of health problems. Household income is one of the most determinant factors of individuals’ living standard in general and consumption in particular.

Table 4:4: Main occupation and monthly income of respondents in the study area

S. No	Main occupation of the respondent	Frequency	Percentage
	Farming	50	16.8
	Business man	123	41.4
	Government employee	92	31.0
	Daily laborer	25	8.4
	if others, specify	7	2.4
	Total	297	100.0
2	Monthly income of households	Frequency	Percentage
	100-1200 ETB	100	33.7
	1201-2400 ETB	69	23.2
	2401-3600 ETB	74	24.9
	3601-4800 ETB	34	11.4
	Above 4801ETB	20	6.7
	Total	297	100.0

Source: Survey data, 2020

Concerning the number of years respondents lived in the study area, about 39(13.1%) stated as they have lived in Mejo for 1 to 5 years, 59(19.9%) stated as they lived for 6 to 10 years, 98(33.0%) reported as they lived for 11 to 15 years, 71(23.9%) testified that as they have lived for 16 to 20 years and 30(10.1%) reported as they lived for 21 and above years (**Figure 4.3**). Now the results show that most of the study participants have lived in Mejo for 11 to 15 years.

This helps to know that respondents who had lived for a long period of time in the study area more likely to provide precise information about water supply and accessibility issue in the long time. In addition, these respondents are more likely to access potable water for domestic purposes since they may know where they can access water in case of shortages in the town.

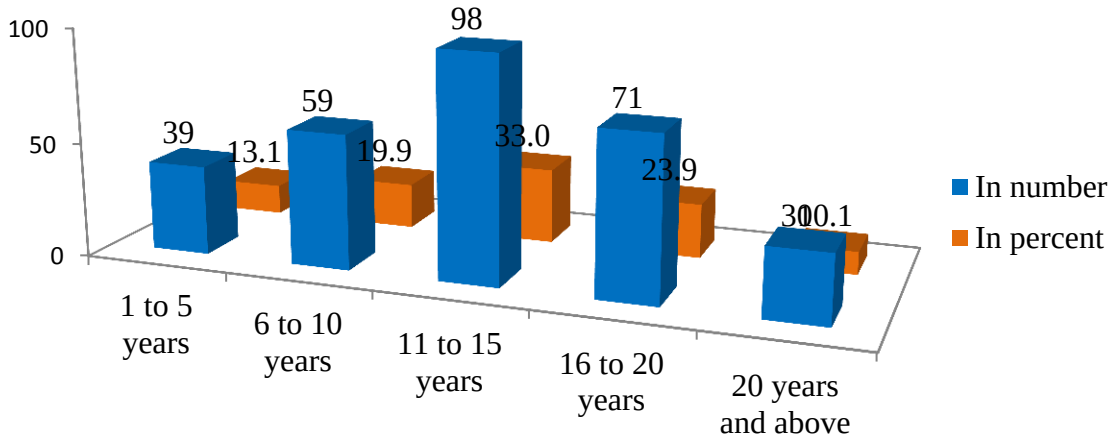

Figure 4:3: Showing the number of years respondents lived in the study area

Source: Survey data, 2020

4.3. The current situations of potable domestic water supply in the area

4.3.1. Water source

Concerning the type of water source, about 12(4.0%) reported the household piped connection, 66(22.2%) told the public water tap, 94(31.6%) described the hand dug well/spring, 61(20.5%) stated the pond, 9(3.0%) testified the river/stream, 8(2.7%) reported the rain water collection and 47(15.8%) stated the shallow water as their source of water for household purposes.

Here, those who reported as they use hand-dug well water proportional dominate the others showing that it was the major source of water for residents in the study area. In addition, it indicates that the community is utilizing the water for drinking which is most probably not safe for drinking and not good for healthy living of the community in the study area.

Picture 1: Water sources in Mejo town
Source: Photo taken by the researcher, 2020

This finding was supported by Water Aid report, (2011) shows that hand-dug well can be one source of water which is one of the traditional methods for water supply system in rural and small town areas of the developing countries, and still most common. These dug wells are made by hands, therefore, there is some restriction in some circumstances, for instances, certain types of ground, such as clays, sands, gravels and mixed soils where only small boulders come across.

Furthermore, the town residents fetch water from various sources during the different seasons and periods of time and shows that there is a shared water source in the study area. This was supported by the focus group discussion where the participants stressed that as they use hand-dug well, public tap and ponds and river water sometimes and others. Here, the results show that residents of study area use both ground water and surface water for most of the household domestic use including drinking.

The key informant interview with water and energy office head stated that as the town residents utilize water from these various sources, and they use household pipe water if

available and hand-dug well mostly. The interviewed health office head also stated that the town dwellers were using water from unprotected source, which can have adverse effects on their health. Currently, the town residents are facing problem of communicable diseases, especially, water borne diseases like typhoid and typhus fever, as monthly as well as yearly report indicates the residents face these diseases again and again in the same year, which means these diseases affect the individuals frequently in the year.

In addition to KIIs, the study conducted in Sebeta District, Oromia Region Meseret (2015), stated that major top ten diseases of the outpatient department were water borne diseases; like giardiasis, typhoid fever and amoeba. This implies that the possibilities to being exposed for water borne disease are quite clear for households` who consume unsafe water.

> *One of the focus group discussion participant stated that "we use unimproved water source most of the time, because the public tap water as well as hand dug well/spring stop working due to various reasons, however, the authorities do not take immediate actions, so, the residents depend on either pond or river water for drinking as well as different household consumption purposes". In addition, the other participant stressed that "we cannot get piped water daily, and it is not sustainable, if it is available morning, we cannot get it afternoon, sometimes even it stop while we are fetching. Surprisingly, it comes again either after the days or weeks or even later than weeks, during that time we fetch water from pond, river or stream, and unprotected dug wells, it has negative effects on our health".*

Picture 2: Focus group discussion in Mejo

Source: Photo taken at field work, 2020

Table 4:5: Domestic water source for respondents in the study area

S. No	Source of domestic water for your household purposes	Frequency	Percentage
1	Piped household connection	12	4.0
	public water tap	66	22.2
	Hand dug-well/spring	94	31.6
	Pond	61	20.5
	River/stream	9	3.0
	Rain water collection	8	2.7
	Shallow wells	47	15.8
	Total	297	100.0

Source: Survey data, 2020

In addition, respondents were interviewed about how they see the location of water with respect to their house and about 39(13.1%) stated very convenient, 157(52.9%) stated the inconvenient, 71(23.9%) stated the fair, 20(6.7%) reported the convenient and 10(3.4%) reported the very convenient. In this study, those who reported the location of water in relation to respondents household as it is inconvenient proportional dominate the others. This shows that the water location in relation to residents household is tiresome, in other words people are fetching the water for domestic use after walking a long distance which is tedious. Not only that even if the water location is not much distant, the queue in which they wait to fetch water is upsetting. In addition, this was supported by the focus group discussion where the participants stated that as they go long distance to fetch water.

> *One of the 32 years female participant state that "we collect water from long distance, even if it is not such a long distance, it takes us about more than 30 minutes, for which reason, we postpone fetching water while we are in need of it, because we cannot access it immediately. Sometimes, the pipe line water stop running while we are waiting to fetch after those who come to that area before us finish, other time, it come and stop at night, which makes it inaccessible for collecting and exacerbated by the long distance". The other 41 years old participant stressed that "the area and distance we fetch the water is not convenient, it is difficult to fetch water at night, since we fear robbers or hyena*

and especially the area around the hand dug well and shallow water are very difficult".

According to WHO, 2004 and WHO/UNICEF, 2010 as cited in Kumessa (2016), concerning the distance as indicator of water accessibility, the criteria used to measure was the proportion of population with access to adequate amount of safe drinking water within 200 meters in urban areas was considered as a convenient. However, in this study it was found that most of the sampled respondents were travelling more than 200 meters to fetch water in the study area. This indicates that the location of the water has been affecting water consumption of household of the Mejo town.

Regarding the transport of water from its source to home, respondents were interviewed and about 220(74.1%) stated that humans carry water from the water source to home, 73(24.6%) reported that as the donkey carry, and 4(1.3%) reported that as the animal pulled cart carry the water. Here, the proportion of those who reported as the humans carry water from its source to home take over the others, showing that humans are the major transport of water from its location to the home of community members.

Table 4:6: Showing the location of water source in relation to respondents home

S. No	Location of the water source with respect to respondents household	Frequency	Percentage
1	Very inconvenient	39	13.1
	Inconvenient	157	52.9
	Fair	71	23.9
	Convenient	20	6.7
	Very convenient	10	3.4
	Total	297	100.0
2	How do you transport water from the source to home?		
	Human load	220	74.1
	Donkey	73	24.6
	Animal pulled cart	4	1.3
	Total	297	100.0

Source: Survey data, 2020

4.3.2. Water collector and accessibility

Concerning the responsible individual for collecting domestic water, about 18(6.1%) stated the husband, 121(40.7%) stated the wife, 117(39.4%) stated the female child (under 18 years), 34(11.4%) stated the male child (under 18 years) and 7(2.4%) stated the others (**Table 4.7**). The burden of water collection does not fall equally in all household members. In this study, looking at the burden by relationships with in household, the responsibility of collecting water primarily falls on wives and female child of the household head in respectively. In developing countries, especially in Sub-Saharan Africa, women and girls bear the burden of fetching water for household use, and often need to travel more than half an hour round trip (WHO/UNICEF, 2010b).

In the study area, the findings indicate that females are more responsible for household water collection than the other household members. For instance, housewives are approximately seven times more likely collected water for household consumption than husband in the study area. This result is consistent with the finding from the Demographic and Health Survey (DHS) report (EDHS, 2011). As the burden of domestic water collection is primarily borne by housewife and school-age female children, it also affects them in many ways like hindering them from exercising their gender equality, social empowerment and school attendance.

Table 4:7: Water collector in Mejo town

S. No	Who is responsible to collect domestic water in your households	Frequency	Percentage
1	Husband	18	6.1
	Wife	121	40.7
	Female child (under 18 years)	117	39.4
	Male Child (under 18 years)	34	11.4
	if others, specify	7	2.4
	Total	297	100.0

Source: Survey data, 2020

4.3.3. Household water demand and consumption

Concerning the demand and consumption of water at household level in the study area, the overall mean demand of water at household's level was 217.7(±8.86SD) liters per a day, with a minimum and maximum demand of water 192.5 liters and 239.77 liters per day, respectively. In addition, the water demand data of households was collected differently based on the seasons, accordingly, the household's water demand during the rainy season and during the dry season were as follows: the mean water demand during the dry season was 117.47(±6.08SD) with a minimum and maximum demand of 91.71 and 131.53 liters per day household level.

Regarding the water demand during the rainy season, the mean demand was 100.22(±7.7SD) liters per day household level with minimum and maximum demand of 81.26 and 119.34 liters per day household level, respectively. This finding indicates that as there was difference in demand of water during the dry season and the rainy season. In the study area, the average daily water demand for each individual was 31.1 liters per day per household, the overall household water demand divided to the average size of the family members.

The focus group discussion also supported the above finding that as they face challenge for water supply during dry season and stressed that even if the demand increases during the dry season, the availability of water decreases and put the residents at challenge of potable water supply. In addition, the participants also described that as they need more water during dry seasons because of the temperature increase, the internal need for drinking water increases, need for washing cloths also increases, and so on.

In relation to the households' water consumption, the mean of overall household's water consumption was 116.08(±8.79SD) liters per day, with a minimum and maximum of the overall household's water consumption of 90.84 liters per day and 138.09 liters per day, respectively. In addition, the household's water consumption was assessed during the different seasons of the year, accordingly, the mean water consumption during the dry season was 67.27(±5.91SD) liters per day per household with a minimum and maximum water consumption of 53.5 liters per day and 81.28 liters per day, respectively, and during the rainy season, the mean consumption of water per household was 48.81(±7.70SD) liters per day with a minimum and maximum water consumption of 29.85 liters per day and 67.93 liters per day, respectively. Here, the results reveal that the average amount of

water households consumed for different domestic activities was very smaller than the households demand for potable water.

Concerning the average daily water consumption was 16.58 liters per day per household, overall household water consumption divided to the average of the family size. This indicates that the Mejo town residents are not consuming the amount of water they need and this was below the recommended amount of water for consumption by the Ministry of Water, Irrigation and Energy MoWIE and WHO for basic access, which was 20 to 50 liters per day per household within the maximum distance of 0.5 km service radius in universal access plan and the average time spent to collect water is 5 to 30 minutes in urban areas (MoWIE, 2011 and WHO, 2004). It was good indicator to shows the water demand and which they were consumed not satisfied with the residents of the study area.

The focus group discussion participants stated that even though there is no sustainable running of pipe water all the time, they meet their demand by fetching water from other source. The most common sources as it was indicated above, they also stressed that hand-dug well helps them most of the time, even if it is not available for households, followed by the public tap and pond. They also stressed that as the public tap and pond support many households; not only during dry seasons but also during summer times, since the pipe water stops suddenly from running, if it was running morning, it is not available afternoon and even stop while the residents are fetching, so it is not sustainable.

This finding was supported by the study conducted on access to water supply in urban poor households in case of Addis Ababa, Ethiopia (Konjit, 2015), where it was found that the majority of respondents get basic access of 15.5 liters per day per person. This was below the recommended amount of water for household consumption by the WHO (2004); the minimum standard that everyone should access was 20 LCD per person water within a maximum distance of 0.5 km. It implies that water accessibility standards are not well exercised in the town.

Table 4:8: Households water demand and consumption in Mejo town

S. No	Households water demand and consumption	Minimum	Maximum	Mean	Std. Deviation
1	Households water demand				
	Overall household water demand	192.5	239.7	217.7	8.86
	Household water demand during the dry season	91.71	131.53	117.47	6.08
	Household water demand during the rainy season	81.26	119.34	100.2	7.70
	Water demand in liter per day per household	27.5	34.25	31.1	1.26
2	Households water consumption				
	Overall households water consumption	90.84	138.09	116.08	8.79
	Households water consumption during the rainy season	29.85	67.93	48.81	7.70
	Households water consumption during the dry season	53.50	81.28	67.27	5.91
	Water consumption in liter per day per household	12.98	19.73	16.58	1.25

Source: Survey data, 2020

In addition, respondents were interviewed about whether they face the domestic water supply problems for household consumption or not, accordingly, about 254(85.5%) reported that as they have faced problems while the rest, only 43(14.5%) respondents stated as they do not face problem of domestic water supply for the household consumptions. Those who reported as they have faced problems during the domestic water supply were interviewed about the season in which they have faced such problems.

Accordingly, about 232(78.1%) of the respondents stated the dry season, 20(6.7%) of the respondents testified the rainy season, and 45(15.2%) of the respondents reported the both seasons. Here, the proportion of those who reported the dry season dominate the others, showing that most of the respondents in the study area face problem of domestic water supply during the dry seasons of the year. This was supported by the focus group discussion where the participants reported as they have faced water supply shortage frequently, especially during the dry seasons, the shallow water stop running, river flow become less, pond start to dry and so on. For that reason, residents cannot get the amount of water they need.

In addition, they were requested to discuss about how they access water during the dry and rainy seasons, especially during the periods of water shortage, and the participants discussed that as they collect from unprotected hand dug well, river, pond, rope pump and buying from water vendors during dry seasons and from rain water, river, unprotected hand dug well, shallow wells, pond, deep well and rope pump during the rainy season. Adding to this the participants stated that as this all was not fulfilling their need.

Regarding the sufficiency of daily piped water access for the household domestic consumption, 255(85.9%) of the respondents stated as they cannot get enough water for household consumption, and while only about 42(14.1%) of the respondents described as they have access to enough daily piped water source. Here, the results indicate that majority of respondents do not have access to enough daily piped water for the household consumption.

Those who responded "No" for the having access to enough daily piped water for the household consumption were interviewed about how often they access piped water and they have responded that once in 2-3 days by 8(3.1%) individuals, once in 4-5 days by 66(25.9%), once in 6-7 days by 69(27.1%), and didn't get piped water for household consumption by 112(43.9%). Here, the results show that those who reported that as they haven't got water in 7 days and only once in 6 to 7 days were about 181(72.1%), showing that about 2/3rd those who didn't get water daily were not accessing water and it shows a serious piped water accessibility problem.

This was supported by the focus group discussions where the participants stated that "accessing piped water is very difficult, sometimes we collect it only once a week, other times 2 to 3 times in a week and at other times even we cannot get the piped water for about 2 weeks". Those who reported as they can get sufficient piped water for household consumption were interviewed about how many times they fetch water per day, and about 6(14.3%) of the respondents reported that as they fetch once a day, 21(50.0%) of the respondents stated as they fetch two times a day and 15(35.7%) of the respondents reported as they fetch three and above times a day.

Here, the proportion of those who reported as they fetch 2 times a day dominates the others. This shows that about half of respondents are losing their other work time as well as they are getting tired while fetching water.

Concerning the paying of the money for water services, about 165(55.6%) of the respondents stated that as they pay money for water services, while about 132(44.4%) of the respondents stated as they do not pay. Here, the results show that most of study participants pay the money for water services. This was supported by the focus group discussion and key informant interview where the participants stated that as the daily piped water access was not sufficient for household consumption. Not only was that, but also as evidenced from FGDs and KIIs, water distribution was not equal between Mejo 01 and Mejo 02 kebeles of the town. In addition, the FGDs confirmed that as the central part of town (Mejo 01) access of piped water more than Mejo 02, because of the distribution problem of the water line, and even when the water runs irregularly, the Mejo 02 could not get household connection piped water access completely.

The FGDs confirmed that as they expend a lot on domestic water consumption just by buying it from vendors or sometimes even they go to water source, at which time they stop their activity even if it is for short period of time, it has effect on their work especially for restaurants, cafeteria and shops. Not only that they also testified that households with low income were less likely to buy water especially during serious water shortage crisis and become exposed to many social and economic problems.

In addition, the other participants stressed that as water shortage is putting them at risk of economic crisis, since, they are expending all what they have on water. They stated that as they buy 20 liters jerry can from water vendors they pay 5ETB and if they need 4 jerry cans for some purposes, they expend 20ETB, as the demand of water increase per day, they indicated that as they expend a lot on water. Sometimes, the price goes more than 5birr for 20 liters of water from water vendors including labor and transport cost. The costs were depending up on the distance (human labor and donkey). The researcher also, reviewed that above challenges in the time of his field observations.

According to United Nation standards of spending on water for household consumption, households were expected not to spend more than 5 percent of their monthly income (Alebel, 2005 as cited in Asnake, 2012). However, most of the sampled respondents in study area stated that as they spend more than what is acknowledged by the UN standard. This expenditure has affected the poor residents of the Mejo town.

Table 4:9: Water accessibility for household consumption in Mejo town

S. No	Variables	Frequency	Percentage
1	Do you get daily piped water access for your household domestic consumption?		
	Yes	42	14.1
	No	255	85.9
	Total	297	100.0
2	If your answer for Q.14 is "No", how often do you get piped water access?		
	Once in 2-3 days	8	3.1
	Once in 4-5 days	66	25.9
	Once in 6-7 days/weekly	69	27.1
	Didn't get daily piped water	112	43.9
	Total	255	100.0
3	How many times do you fetch water per day from different sources?		
	once a day	6	14.3
	two times a day	21	50.0
	Three and above 3 times a day	15	35.7
	Total	42	100.0
4	Do you pay the money for the water services?		
	Yes	165	55.6
	No	132	44.4
	Total	297	100.0

Source: Survey data, 2020

Then, the study participants were questioned about for what serious problem do they face domestic water shortage, and about 161(54.2%) of the respondents had faced a serious shortage of water related problem for drinking purposes, 14(4.7%) of the respondents had faced a serious shortage of water for washing clothes, 85(28.6%) of the respondents had faced a serious shortage of water for cooking, 23(7.7%) stated that as they have faced problem for bathing and 14(4.7%) reported that as they have faced problem for flush toilet (**Figure 4.4**). At this time, those who stated as they face serious domestic water shortage in their household for drinking water dominate the other, showing that most of

the respondents were facing serious water shortage problems for drinking purposes. This was supported by the focus group discussion where the participants stated that when the pipe water is not available, they face serious challenge for drinking water. Then, more than half of the town dwellers fetch water from unprotected sources, namely Chichu and Gulicha rivers for domestic purposes and this may expose the health of people at risk, it is not appropriate for drinking purposes.

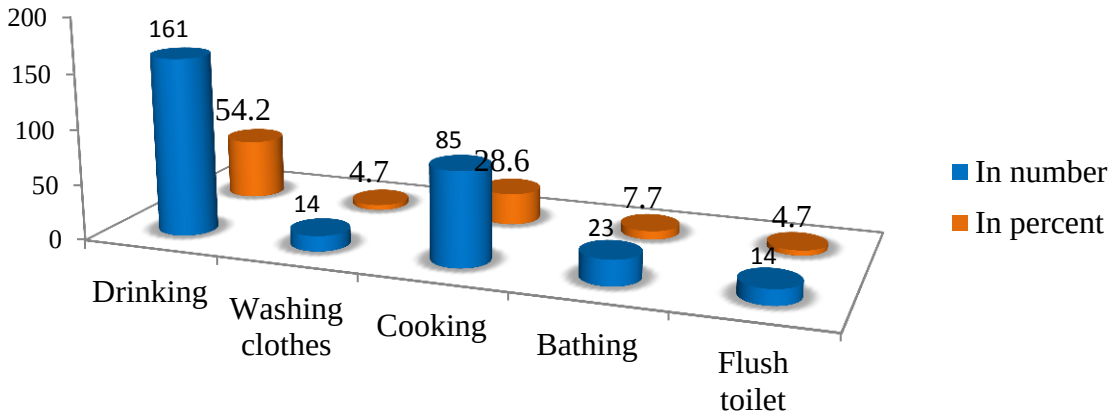

Figure 4:4: For which purpose faces serious domestic water shortage in your households
Source: Survey data, 2020

Concerning the time taken to fetch water from its source, 9(3.0%) of the respondents stated as it take them up to 5 minutes, 23(7.7%) of the respondents testified as it take them about 5 to 30 minutes, 103(34.7%) of the respondents reported as it take them 30 minutes to 1 hour, 162(54.5%) of the respondents stated as it take them greater than one hour. Here, those who reported as it take them greater than an hour proportional dominate the others showing that most of the respondents fetch water from a longer distance. This indicates that there is no access to water according to WHO water accessibility indicator (WHO, 2004).

In addition, this was also supported by the focus group discussion where the participants stressed that as they go long distance to fetch water, not only that they also described as they wait until those who arrived before them at water source finish fetching. So, in general, they have stated that as they spent for a long period of time in fetching water.

Table 4:10: Consequences of nearby water unavailability in the study area

S. No	Variables	Frequency	Percentage
1	How much time spent do you take to get the water?		
	Within 5 minutes	9	3.0
	5-30 minutes	23	7.7
	30 minutes-1 hours	103	34.7
	Greater than an hours	162	54.5
	Total	297	100.0

Source: Survey data, 2020

Regarding the buying of water using the money for household consumption, 228(76.8%) reported as they bought water from water vendors by the money, while only 69(23.2%) reported as they did not buy. In this study, the proportion of those who reported as they bought water for household consumptions dominate the others was showing that majority of the populations in the town collect water after buying.

Then, household were interviewed to rate the situation of domestic water supply in general in their town, accordingly, about 84(28.3%) reported the bad, 118(39.7%) reported the inadequate, 56(18.9%) reported the average, 34(11.4%) reported the good, and 5(1.7%) reported the adequate. Here, those who rated the general situation of water supply as inadequate proportional dominate the others was indicating that the domestic water supply in the study area was insufficient.

This was supported by the KIIs where the interviewee stated that the real total discharge data of water from the water sources of the Mejo town was $25m^3$ from nearby Chichu river collecting chamber and it was constructed by Sidama development association fund and $75m^3$collects water from other three springs from length in 4.5 km water distributed by the motor gravity to the total population of the town residents. However, interviewee stated that this is not enough to the town residents, but is serving only as the basic, so the town dwellers use other unprotected source. In general, the potable domestic water supply is not adequate. Besides, the participants of focus group discussion underscored that the available sources of water are not enough to meet even the current water demand of the town.

In addition, it was in line with the study conducted on assessment of local government service delivery in the case of drinking water supply and sanitation in Burayu city, where half of respondents reported as the water supply was bad and inadequate, while the rest indicated that as the water supply was moderate and as it cannot fulfill consumer demands (Girma, 2018).

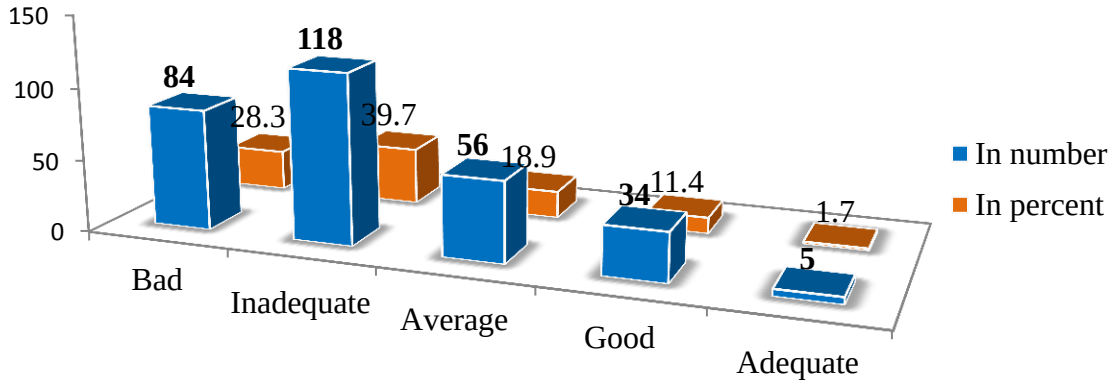

Figure 4:5: General situation of domestic water supply in the study area

Source: Survey data, 2020

4.4. Challenges of sustainable potable domestic water supply in the area

4.4.1. Challenges of the sustainable potable domestic water supply

Regarding the challenges of sustainable potable domestic water supply, a series of questions were organized to be responded in Likert scale. Accordingly, concerning the rapid population growth and town expansion as a challenge, 7(2.4%) stated as they disagree strongly, 19(6.4%) reported as they disagree, 43(14.5%) stated as they are neither disagree nor agree, 64(21.5%) testified as they agree and 164(55.2%) reported as they agree strongly. Here, the proportions of those who agree strongly dominate the others. In addition, about 228(76.8%) agree with the notion that states rapid population growth and town expansion as a challenge for sustainable potable domestic water supply coverage increment is very small as compared to the population growth.

As KIIs of water, mines and energy offices head, the current water source for the town is the springs which were built before ten years for a total population of not more than five thousand, but now, the total population of the town is more than twelve thousand. Currently, the springs which were built before ten years was serving the present total

population. The rapid population growth and urban expansions in the Mejo town seeks new water source infrastructure, however, even if there were another springs built after the one which was built before ten years, still it was not functional and this has been putting the town residents in the state of water shortage. This finding agree with the study conducted on households` access to domestic water use in Sebeta hawas district, Oromia region (Meseret, 2015), where the result reveals that population growth and urban expansion in the town has a direct influence on household piped water accessibility to the dwellers.

As show in (**Table 4.11)** below, the financial insufficiency/limited budget as a challenge for sustainable potable domestic water supply, 18(6.1%) stated that as they disagree, 40(13.5%) stated as are neither disagree nor agree, 76(25.6%) stated as they agree and 163(54.9%) testified as they agree strongly. Now, the proportions those who stated as they agree strongly dominate the others. In addition, those who reported as they agree to the statement that situations as financial insufficiency/limited budget as a challenge for sustainable potable domestic water supply were about 239(80.5%). This indicates that most of the respondents believe that as the financial insufficiency/limited budget is the challenge for sustainable potable domestic water supply.

Relating to the lack of institutional capacity, 20(6.7%) stated that as they disagree strongly, 16(5.4%) reported as they disagree, about 40(13.5%) testified as they neither disagree nor agree, 143(48.1%) reported as they agree and 78(26.3%) stated as they agree strongly. Here, those who reported as they agree with the notion of lack of institutional capacity challenges the sustainable potable domestic water supply in the study area. In addition, those who agree and strongly agree combined together make up about 221(74.4%), showing that about $3/4^{th}$ of study participants believe that lack of institutional capacity challenges the supply of sustainable potable domestic water in the study area.

Concerning the insufficient water sources, out of total interviewed respondents, about 18(6.1%) reported that as they disagree strongly, 99(23.6%) stated as they disagree, 152(51.2%) indicated as they neither disagree nor agree, 20(6.7%) told that as they agree and 8(2.7%) informed as they agree strongly. Now, those who stated as they neither disagree nor agree proportionally dominate the others indicating that they cannot decide on whether the insufficient water sources are either the challenge or not.

Relating to the frequent breakdown of pipe line as a challenge for sufficient potable domestic water supply, 17(5.7%) stated as they disagree strongly, 70(23.6%) disagree, 76(25.6%) testified as they neither disagree nor agree, 94(31.6%) stated as they agree and 40(13.5%) reported as they agree strongly. In this study, those who agree with the view of frequent breakdown of pipe line is the challenge for sustainable potable domestic water supply agree proportionally dominate the others and in general those who agree with the statement of frequent breakdown of pipe line is the challenge for sustainable potable domestic water supply is about 134(45.1%), showing that nearly half of the respondents agreed with the frequent breakdown of pipe line contribute for the challenge of potable domestic water supply in the study area.

As regards the topography of the area as a challenge for sustainable potable domestic water supply, 19(6.4%) disagree that the topography of the area affects the water supply, 79(26.6%) reported that as they neither disagree nor agree with the topography of the area challenges the domestic water supply sufficiently, 138(46.5%) agree with the belief that topography of the area challenges domestic water supply sufficiently, and 61(20.5%) stated that as they agree strongly. Here, those who reported as they agree with the statement of topography of the area challenges the domestic water supply sufficiently proportional dominate the others. In addition, about 199(67.0%) respondents agree with the notion that the topography of the area confronts the sufficient potable domestic water supply in the study area. This shows that topography of the study area was the challenges for domestic water supply sufficiently.

As KIIs with head of water, mines and energy office shows, the topography of Mejo town was a difficult for water flow from low altitude to high altitude, which is found at 2200 meters above mean sea level and mostly in dry season water flows down ward and at that time in the high elevation water supply decreases.

This was strengthened by the focus group discussion where the participants indicated that the population number has increased from time to time and the water and energy office is not competent with such situation, so, the town dwellers are facing potable water shortage problems. In addition, the water line also breaks continually, the office workers repair it, however, the repairmen is not sustainable, the other thing is the water in the pipe line is not sufficient.

One of the FGD participant stated that "the office working on water supply is not competent, their workers are not foray, they tell us that as they have repaired the lines broken, but again the same problem occurs, sometimes they report budget unavailability to correct the problems that hinder adequate supply of water, other times they report other think but still the problem of water shortage is not solved, we have complained so many times but no one give us response". The other participant also stressed that "they have to consider the increment of population, but they are not working to improve the water shortage problems, rather they work to promote their positions, no one considers the community".

Table 4:11: View of respondents on challenges of the sustainable potable domestic water supply

S. No	Variables	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
		No (%)	No (%)	No (%)	No (%)	No (%)
1	Rapid population growth and town expansion	7(2.4)	19(6.4)	43(14.5)	64(21.5)	164(55.2)
2	Financial insufficient/limited budget	0(0.0)	18(6.1)	40(13.5)	76(25.6)	163(54.9)
3	Lack of institutional capacity	20(6.7)	16(5.4)	40(13.5)	143(48.1)	78(26.3)
4	Insufficient water sources	18(6.1)	99(33.3)	152(51.2)	20(6.7)	8(2.7)
5	Frequent breakdown of pipe line	17(5.7)	70(23.6)	76(25.6)	94(31.6)	40(13.5)
6	Topography of the area	0(0.0)	19(6.4)	79(26.6)	138(46.5)	61(20.5)

Source: Survey data, 2020

Then, depending on the series of questions used to assess the challenges of potable water supply, the overall challenge status was calculated. First, the mean score was computed using the six questions in above table, then those who scored above the mean were considered as they have reported as serious challenge and those whose score was below the mean were considered as they have reported that there was low challenge in potable water supply at household level. In this specific study, it was found that about 22(7.4%)

stated as there was low challenge while the majority, 275(92.6%) reported as there was serious challenge (**Figure 4.6**). Here, the results show that majority of respondents described as there was serious challenge in domestic potable water supply at household level in the study area.

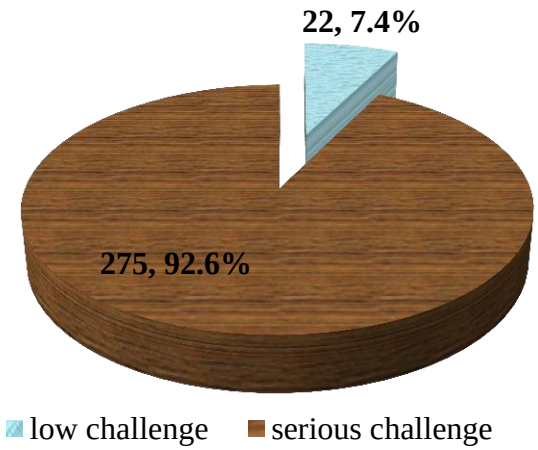

Figure 4:6: Showing the overall challenge of sufficient potable water supply in the study area

Source: Survey data, 2020

4.4.2. Main reasons to sustainable domestic water supply problems

As show in the table below, concerning the main reason for sustainable domestic water supply problems, respondents were interviewed to respond for Likert scale questions. Then, out of 297 interviewed respondents, 4(1.3%) stated as they disagree strongly on the notion that lack of sufficient water due to continuous interruption as the main reason, 21(7.1%) reported as they disagree, 103(34.7%) testified as they neither disagree nor agree, 130(43.8%) agree and 39(13.1%) agree strongly that lack of sufficient water due to continuous interruption as a main reason for the sustainable domestic water supply problems. Here, those who reported as they agree with the statement of lack of sufficient water due to continuous interruptions proportionally dominate the others.

In addition, about 169(56.9%) stated that as they agree with the notion that lack of sufficient water due to continuous interruption as the main reason for the sustainable domestic water supply problems. So, lack of sufficient water due to continuous interruption is the main reason for the sustainable domestic water supply problems.

This finding was supported by the study conducted on urban poor residents and water accessibility in the case of Addis Ketema Sub-City, where the water interruption is major

challenges and it had affected them immensely. During such interruption, residents carry burden of traveling long distance to fetch water, pay higher price per container and face water shortage in view of economical use (Meskerem, 2007).

Relating to lack of sufficient water due to absence of fair distribution as a main reason for sustainable domestic water supply problems, about 12(4.0%) disagree strongly, 20(6.7%) disagree, 77(25.9%) neither disagree nor agree, 112(37.7%) agree and 76(25.6%) agree strongly with the notion of lack of sufficient water due to frequent distribution problems as the main reason for sustainable domestic water supply problems. Here, those who agree dominate the others showing that the main reason for sufficient domestic water supply problem is the lack of sufficient water due to frequent distribution problems. When those who agree and strongly agree combined together, nearly 2/3rd of the respondents agree with lack of sufficient water due to frequent distribution problems is the main reason for the sufficient domestic water supply problems.

Regarding to lack of community participation and management as a main reason for sufficient domestic water supply problems, 13(4.4%) disagree strongly, 41(13.8%) disagree, 35(11.8%) neither disagree nor agree, 134(45.1%) agree and 74(24.9%) agree strongly. In this specific study, those who reported as they agree with the statement of lack of community participation and management as a main reason for sufficient domestic water supply problems dominate the others. In addition, more than 2/3rd of study participants agreed with the notion that lack of community participation and management as the main reason for the sufficient domestic water supply problems.

This was supported by the focus group discussions where the study participants stressed that water interrupts continuously, even if it come it is low quality water, contain unnecessary materials in it, the District water office gives less attention, if they start working, it seems that the workers do not have appropriate knowledge and expertise, so the line breaks immediately after they repaired. Key informant interview with District water and energy office head indicated that electric power outage problems, the lack of financial capacity to carry out maintenance and expansion work on their system, topography of the study area, fast urban expansion, failure of water infrastructure and electromechanical system were the main reasons for domestic water supply problems.

Table 4:12: Main reasons to sustainable domestic water supply problems in Mejo town

S. No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
		No (%)	No (%)	No (%)	No (%)	No (%)
1	Lack of sufficient water due to continuous interruption	4(1.3)	21(7.1)	103(34.7)	130(43.8)	39(13.1)
2	Lack of sufficient water due to absence of fair distribution	12(4.0)	20(6.7)	77(25.9)	112(37.7)	76(25.6)
3	Less attention of district concerning bodies'	5(1.7)	20(6.7)	39(13.1)	162(54.5)	71(23.9)
4	Lack of community participation	13(4.4)	41(13.8)	35(11.8)	134(45.1)	74(24.9)

Source: Survey data, 2020

Generally, the overall status of main reasons to sustainable domestic water supply problems in the study area was assessed using a series of questions that was measured in Likert scale and the mean score was computed. Accordingly, the score above the mean score was considered as the significant reason for the sustainable domestic water supply problem and the score below the mean was considered as the non-significant reason for sustainable domestic water supply problem.

Therefore, in this study it was found that the reasons presented for sustainable domestic water supply problems were described as the significant by 215(72.4%) respondents and about 82(27.6%) respondents stated that as these reasons cannot be actually reason for sustainable domestic water supply problems (**Figure 4.7**). Here, those who testified as the reasons were really the reasons for sustainable domestic water supply problems take over the others showing that the main reasons were actually the real reasons for sustainable domestic water supply problems.

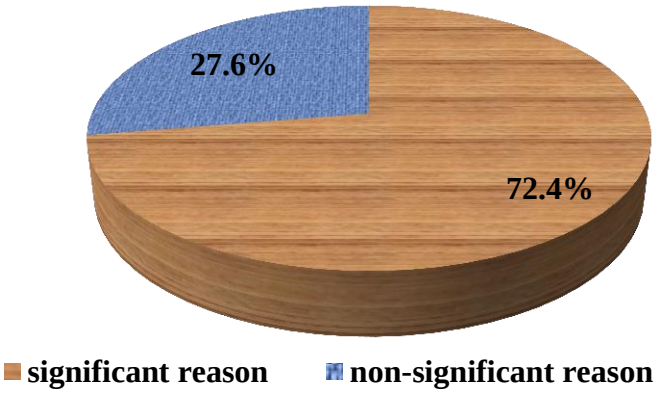

Figure 4:7: Showing the main reasons for sufficient potable domestic water supply problem in the study area

Source: Survey data, 2020

In addition, respondents were interviewed about how they fill the water demand and 35(11.8%) stated the using the river water, 143(48.1%) stated the using unprotected spring water, 106(35.7%) stated the using water vendors, and 13(4.4%) reported the usage of water from the different water sources to fill their water demand. Here, those who reported as they are using the unprotected spring water proportional dominate the others, showing that most of the respondents were fulfilling their water demand from unprotected source and water vendors, respectively.

This was supported by the focus group discussion and key informant interview. The focus group participants stated that as they fulfill their water demand through using the unprotected water, from spring, pond, river and surface waters. The key informant interview also supported the above finding by indicating that most of the town residents use unprotected water source when the piped water or other protected water sources are interrupted due to various reasons. Mostly, piped water sources interrupt as a result of break in pipe line and shortage of running water in the tank. Then, the residents collect the water for their household consumption, including drinking from various unprotected sources.

Table 4:13: Way of filling water demand when shortage encountered

S. No	How can you fulfill your water demand?	Frequency	Percentage
1	By using river water	35	11.8
	By using unprotected spring water	143	48.1
	By using from water venders	106	35.7
	If other, specify	13	4.4
	Total	297	100.0

Source: Survey data, 2020

4.5. Impacts of the potable domestic water supply shortages on the household socio-economic consequences

4.5.1. Social impacts of water supply shortage

It is impossible to have a clean and safety environment without water. Water is necessary in promoting personal hygiene and cleaning the environment. We use water to clean ourselves, our clothes, our dishes, our cars and everything else around us. Without an adequate and wholesome water supply, health cannot be maintained. Thus, inaccessibility of improved potable domestic water supply influences everybody's health, wellbeing, life expectancy, education conditions and social development (Minwuye, 2015). Accordingly, respondents were interviewed about different social and economic impacts of water supply shortages in the study area through using the questions organized to be responded in Likert scale.

For that reason, regarding the incidence of water born disease like typhoid fever, typhus, diarrhea and cholera as a social related impact of water supply shortage, about 11(3.7%) stated as they disagree strongly, about 32(10.8%) testified as they disagree, 21(7.1%) respondents neither disagree nor agree, 68(22.9%) stated as they agree and 165(55.6%) reported as they agree strongly. Here, the results show that those who reported as they agree strongly proportional dominate the others. In addition, both agree and those who agree strongly combined together make up 233(78.5%) stated that as they agree with the incidence of water born disease like typhoid fever, typhus, diarrhea, and cholera as a result of shortage of water supply. This reveals that majority of respondents agreed with the incidence of water born disease are the impacts of water supply shortage.

The data was collected from Mejo Primary Hospital indicated that the health impacts of water shortages were water borne related top ten diseases in the last three quarters report shows the large numbers of residents were affected. The severity of these diseases is increasing from time to time in the town and these include typhoid and typhus fever, diarrhea, and cholera are the major among the many. This finding was supported by the study conducted on the causes and impacts of urban water scarcity on households in the Burayu town administration Kumessa (2016) where the impact of water scarcity has brought economic and health impacts on the households.

Concerning the water supply shortage brings sanitation and hygiene problems, about 6(2.0%) stated as they disagree strongly, 42(14.2%) testified as they disagree, 28(9.4%) reported as they neither disagree nor agree, 142(47.8%) stated as they agree and 79(26.6%) reported as they agree strongly. Here, those who reported as they agree proportional dominate the others. In general, out of total respondents interviewed, about 221(74.4%) stated that as they agree with shortage of water supply brings sanitation and hygiene problems. This shows that sanitation and hygiene problems can be solved only when the water is supplied sufficiently.

Regarding the dropout of school by the children due to shortage of water, 29(9.8%) stated as they disagree strongly, 45(15.2%) stated as they disagree, 124(41.8%) reported as neither disagree nor agree, 95(32.0%) agree and 4(1.3%) testified as they agree strongly. Here, those who reported as they neither disagree nor agree proportional dominate the others. Concerning the late attendance to school as a social impact of shortage of water supply, about 23(7.7%) stated as they disagree strongly, 28(9.4%) disagree, 57(19.2%) reported as they neither disagree nor agree, 130(43.8%) agree and 59(19.9%) agree strongly towards the late attendance to school as an impact of sustainable domestic water supply shortages. Here, those who reported as they as they agree proportional dominate the others, showing that late attendance of school can be due to shortage of water supply.

Regarding walking for long distance to collect water, 10(3.4%) stated as they disagree strongly, 15(5.1%) disagree, 74(24.9%) neither disagree nor agree, 147(49.5%) agree and 51(17.2%) agree strongly with the notion that people walk a long distance to collect water. Here, those who stated as they agree towards the people walk a long distance to collect water is the social impact of the sustainable domestic water supply problems dominate the others. This shows that most of the respondents in the study area complain

about walking a long distance to fetch water as the problem of not supplying sustainable water.

Concerning the tiredness of carrying water as a social related impact of sustainable domestic water supply problem, about 15(5.1%) stated as they disagree strongly, 25(8.4%) testified as they disagree, 57(19.2%) told as they neither disagree nor agree, about 138(46.5%) reported as they agree and 62(20.9%) stated as they agree strongly. Here, those who reported as they agree proportional dominate the others. In addition, those who agree and agree strongly combined together make up about 200(67.3%) indicating that tiredness of carrying water is the social impact of domestic water supply problem. This was supported by the focus group discussion where the participants stated that as they have many problems due to shortage of potable water for household consumption. The key informant interview with the water and energy office head and health office head also showed similar thing that the water shortage brings on social life and economy of households.

> *One of the FGD participant stated that "we face water related illnesses many times in a year, like typhoid, typhus, diarrhea are common illnesses that we always visit health facilities, not only that we wash our cloths after they get very dirty, sometimes when water shortage become serious problems, we and our children go a long distance to fetch water, thereby our children may not go to school on time, and even carrying water for a long distance is very tiresome activity". The other participant stressed that "we wear cloths which are dirty, take a shower once a week even if it is needed for us at least every 2 days. Children face problem of absenteeism from school while fetching water from long distance". The key informant interview with "water and energy office head also indicated that the water supply shortage is putting the community at serious social impacts. The head of office described that "residents are facing serious problem in fetching water from long distance in case no water in nearby areas, at which time they get tired and so on". The health office head also stated that as "the town residents are facing many social impacts associated with water supply shortages and emphasized that water borne diseases are affecting so, many residents highly and so many peoples are getting sick and visit health facility again and again. The most common diseases that the residents are incurring because of water supply shortage was typhoid, typhus fever and diarrhea are the most common ones".*

Picture 3: Key informant interview with water and energy office and health office heads

Source: Photo taken at field work, 2020

Table 4:14: Perception of respondents on social impact of water shortage problem

S. No	Variables	Strongly disagree No (%)	Disagree No (%)	Neutral No (%)	Agree No (%)	Strongly agree No (%)
1	Incidence of water borne disease like typhoid fever, typhus, diarrhea, cholera	11(3.7)	32(10.8)	21(7.1)	68(22.9)	165(55.6)
2	Brings sanitations and hygiene problems	6(2.0)	42(14.2)	28(9.4)	142(47.8)	79(26.6)
3	Children school drop out	29(9.8)	45(15.2)	124(41.8)	95(32.0)	4(1.3)
4	Late children from school attend time	23(7.7)	28(9.4)	57(19.2)	130(43.8)	59(19.9)
5	Walking for long distance to collect water	10(3.4)	15(5.1)	74(24.9)	147(49.5)	51(17.2)
6	Tiredness of carrying water	15(5.1)	25(8.4)	57(19.2)	138(46.5)	62(20.9)

Source: Survey data, 2020

In general, the overall status of social impact of water supply shortage was assessed using a series of questions that were presented in the above table and measured in Likert scale. Then, using the assumption of Likert scale questions analysis, the mean score was computed and the overall status of impact was categorized into two; these are low social impact and high social impact of water supply shortage.

Accordingly, the score above the mean was considered as the serious social impact and the score below the mean score was considered as the low social impact. In this way, it was found that low social impact of water supply shortage was 88(29.6%) and high social impact of water supply shortage was 209(70.4%) in the study area (**Figure 4.8**). Here, the results show that the high social impact of water supply shortage takeover the low social impact of water supply shortage. This indicates that residents of Mejo town are facing the high social impact of water supply shortage.

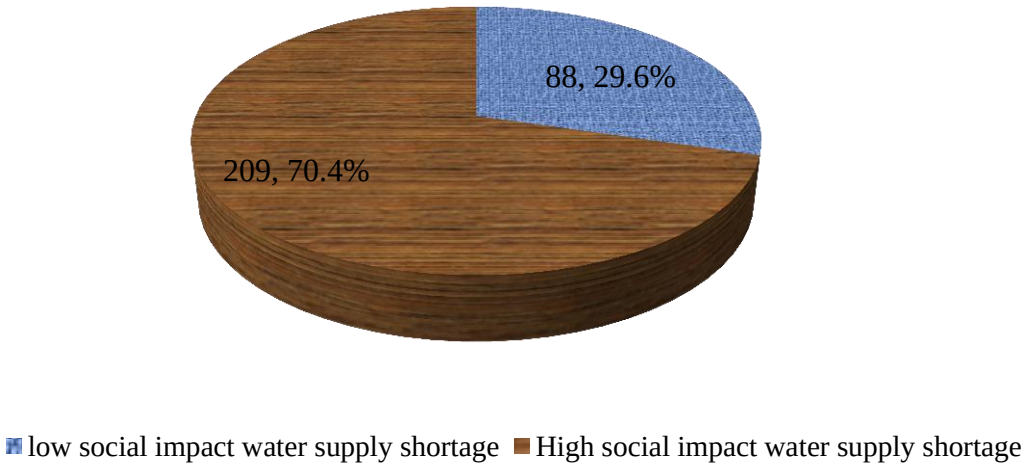

Figure 4:8: Showing the overall social impact of sufficient potable domestic water supply shortage in the study area

Source: Survey data, 2020

4.5.2. Economic impacts of water supply shortage

Concerning the economic related impacts of sustainable domestic water supply problem, respondents were interviewed about a series of questions to be responded in Likert scale. Accordingly, about 10(3.4%) stated as they disagree strongly, 30(10.1%) testified as they disagree, 92(31%) described as they neither disagree nor agree, 129(43.4%) agree and 36(12.1%) agree strongly towards sustainable water supply problem brings unbalanced cost purchasing in jerry cans. Here, those reported as they agree proportional dominate

the others. In general, more than half of study participants agree with the notion that sustainable domestic water supply problem brings unbalanced cost purchasing water in jerry cans. This indicates that shortage of domestic water supply leads to unbalanced cost through purchasing the water in jerry cans.

Concerning shortage of sustainable water supply brings unbalanced cost purchasing bottled water, about 40(13.5%) stated that as they disagree strongly, 96(32.3%) testified that as they disagree, 141(47.5%) reported that as they neither disagree nor agree, 20(6.7%) stated that as they agree. Now, the results show that about half of respondents replied that as they neither disagree nor agree.

Regarding the shortage of water supply brings high water costs, about 13(4.4%) stated as they disagree strongly, 46(15.5%) stated as they disagree, 59(19.9%) reported that as they neither disagree nor agree, 122(41.1%) testified as they agree, and 57(19.2%) informed that as they agree strongly. At this juncture, those who reported as they agreed (41.1%) majority of respondent's water shortage brings high water costs. This shows that 179(60.3%) of respondents stated that as they agree and strongly agree with the sustainable domestic water supply problem brings high water cost respectively.

Regarding to the sustainable domestic water supply problem slow down economic development activities, about 9(3.0%) stated as they disagree strongly, 18(6.1%) described as they disagree, 52(17.5%) stated that as they neither disagree nor agree, 108(36.4%) testified as they agree and 110(37.0%) reported that as they agree strongly. Here, those who reported as they agree strongly with the shortage of domestic water supply slow down economic development activities proportional dominate the others.

In general, about 218(73.4%) of respondents agree and strongly agree with the shortage of sustainable domestic water supply leads to slow down of economic development activities in the study area.

Table 4:15: Perception of respondents on the economic impact of water supply shortage in the study area

S. No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
		No (%)	No (%)	No (%)	No (%)	No (%)
1	Brings unbalanced cost purchasing water in jerry cans	10(3.4)	30(10.1)	92(31)	129(43.4)	36(12.1)
2	Brings unbalanced cost purchasing bottled water	40(13.5)	96(32.3)	141(47.5)	20(6.7)	0(0.0)
3	Brings high water costs	13(4.4)	46(15.5)	59(19.9)	122(41.1)	57(19.2)
4	Slowing down economic development activities	9(3.0)	18(6.1)	52(17.5)	108(36.4)	110(37.0)

Source: Survey data, 2020

Concerning the overall status of economic impact of water supply shortage, the researcher used four questions these were organized to be responded in Likert scale and the mean score was calculated. Then, the score below the mean score was considered as the low economic impact of water supply shortage and the score above the mean was considered as the high economic impact of water supply shortage.

Accordingly, this study found that about 116(39.1%) respondents testified that as they faced low economic impact of water supply shortages and the majority, 181(60.9%) describes as they have faced the high economic impact of water supply shortage (**Figure 4.9**). This was supported by the focus group discussion where the participants stated that as they have faced serious problem of financial/economic crisis, since they buy water from vendors, who purchase the water jerry can at high price.

This was in line with the study conducted in Burayu, where it was stated that the shortage of water supply increases the negatively economic impact on households. In addition, it was indicated as the town residents purchase big tanks for water collection, purchase bottled water for drinking and purchases water from neighbors for different household consumption, therefore, these households incur hand-dug well extraction cost which in one way or the other affects their economy (Kumessa, 2016). Furthermore, the study

conducted on assessment of potable water supply in Awaday town Mekonin and Uttawa (2012), reported that the effect of poor water supply in urban areas of Ethiopia has high impact on the living condition of the towns' communities and economic development of the country.

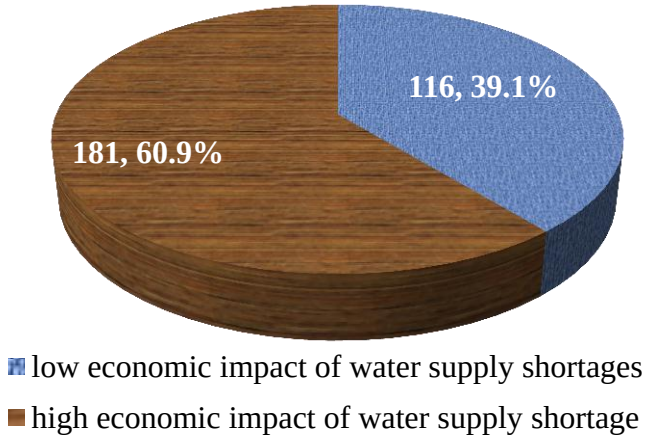

Figure 4:9: Showing the economic impact of sufficient domestic potable water supply shortage in the study area

Source: Survey data, 2020

Then, respondents were interviewed about expenses they incur because of water born disease and about 82(27.6%) stated as they expend 150 to 1400ETB, 114(38.4%) testified as they expend 1401 to 2800 ETB, 80(26.9%) reported as they expend 2801 to 4200ETB and 21(7.1%) stated as they expend above 4201 ETB. Here, those who reported as they expend per year for medical purposes to all family under one roof was 1401 to 2800ETB proportional dominate the others. The result indicates that the town residents are facing serious problem in expending for medical purposes for diseases related with water quality and this also widely affects the monthly income in the households, poor households was more severe from this challenges in the Mejo town.

This was supported by the focus group discussion and key informant interview where the FGD participants stated that as they incur water borne illnesses frequently within a single year and visit health facility many times and pay money for medical services. In addition, the district health office head also added that as the town residents face serious problem due to water borne diseases, like typhoid, typhus fever and others those are associated with poor potable water supply.

Table 4:16: Medical purpose expenses for water borne diseases per year in the study area

S. No	Variables	Frequency	Percentage
1	Water borne disease expenses if the disease occurrences is happen		
	150-1400ETB	82	27.6
	1401-2800ETB	114	38.4
	2801-4200ETB	80	26.9
	Above 4201ETB	21	7.1
	Total	297	100.0

Source: Survey data, 2020

Regarding the respondents were interviewed about the degree of impacts domestic water supply shortage bring on their household socio-economic status, 8(2.7%) stated that as it was low, 13(4.4%) described as it was moderate, 102(34.3%) conveyed that as it was high, 174(58.6%) reported as it was very high (**Figure 4.10**). Here, those who reported the impact of domestic water supply shortage towards the respondents' socio-economic status was proportional very high is dominate the others showing that domestic water supply shortage impacts the socio-economic status highly.

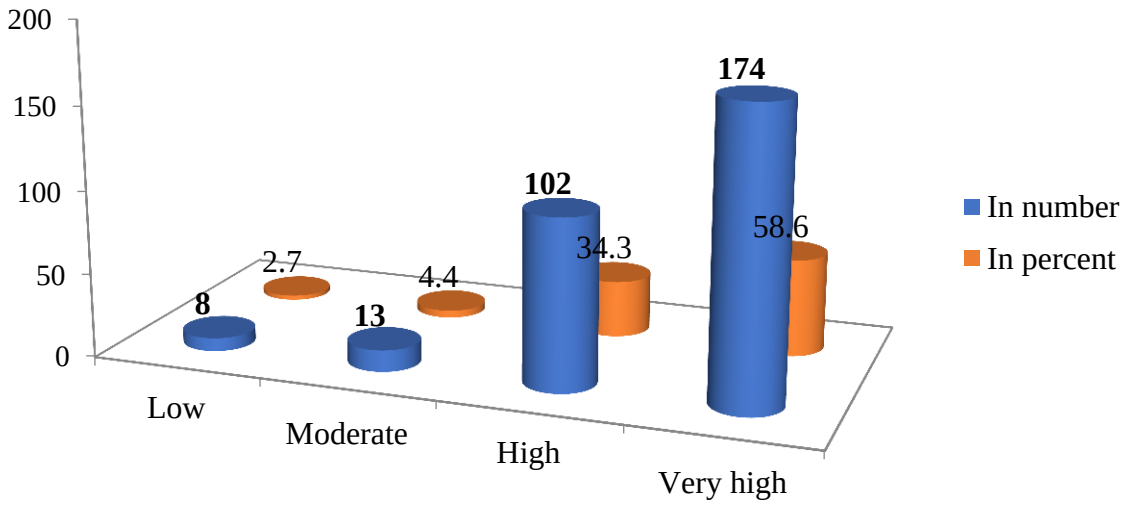

Figure 4:10: Degree of impacts of domestic water supply shortage brings on your household socio-economic consequences

Source: Survey data, 2020

4.6. Roles of the local government to sustain potable domestic water supply

Concerning the roles of local government to sustain potable domestic water supply in the study area, respondents were interviewed about who is the responsible body for sustaining potable water supply in the town, and about 184(62.0%) stated government, 55(18.5%) stated the non-governmental organization, 43(14.5%) testified the community based organizations and 15(5.1%) reported the others. Here, those who reported that government is the responsible body to sustain potable domestic water supply proportional dominate the others, followed by those who reported the non-government organization. Then, for those who responded that government is the responsible body for sustaining potable water supply in the town were interviewed about which government body is responsible for; accordingly, about 21(7.1%) indicated the municipality office as the responsible body, 164(55.2%) reported the water, mines and energy office as the responsible body, 2(0.7%) conveyed the kebele administrations as the responsible body, 110(37.0%) reported the Woreda administrations as the responsible body. Here, those who reported that water, mines and energy office as the responsible body proportional dominate the others, showing that the respondents are also aware of that water, mines and energy office responsibility in sustaining the potable water supply in the town.

Table 4:17: Responsible body for sustaining the potable water supply in the study area

S. No	Variables	Frequency	Percentage
1	Who are responsible for sustain potable water supply in your town?		
	Government	184	62.0
	Nongovernment-Organizations	55	18.5
	Community based organizations	43	14.5
	if others, specify	15	5.1
	Total	297	100.0
2	If the Q.35 is “1”, which government institution provides water in your area?		
	Mejo municipality office	21	7.1
	Water, Mines and Energy Offices	164	55.2
	Kebele Administrations	2	.7
	Woreda Administrations	110	37.0
	Total	297	100.0

Source: Survey data, 2020

Regarding the overall progress of potable water supply to satisfy the demand of the population, respondents were interviewed about what do they say about the overall supply progress of potable water to satisfy the demand of the population at the present time. Then, about 23(7.7%) reported that as they don't know, 232(78.1%) stated that as the progress is decreasing, 23(7.7%) reported that as the progress remain the same, and 19(6.4%) stated that as the progress is increasing. Here, those who reported that as the overall supply progress of potable water to satisfy the demand of the population is decreasing proportional dominate the others.

Those who reported as the overall progress of potable water supply is decreasing were interviewed about the reason that arises from the administrative body for the decreasing progress and about 59(19.9%) stated that as the give some attention, 165(55.6%) reported that as they give less attention, 73(24.6%) stated that as they give no attention at all. Here, those who stated as the administrative body gives less attention for decreasing overall supply progress of potable water to satisfy the demand of the population proportional dominate the others showing that decreasing overall supply of potable water was mainly due to negligence of administrative body.

In addition, respondents were interviewed about how they see the level of efforts of the local government to reduce domestic water supply problems for their town, and about 12(4.0%) stated that as they don't know, 133(44.8%) reported the poor efforts, 120(40.4%) testified the some efforts, only 28(9.4%) respondents reported that as the efforts of local government was good and only 4(1.3%) respondents stated that as the effort was excellent towards reducing the domestic water supply problems. Here, those who reported the efforts of local government to reduce the domestic water supply problem were poor effort proportional dominate the others. This shows that local government is not working to towards the improving potable water supply in the study area.

This was strengthened by the focus group discussion where the discussants testified that the water supply problems were exacerbating from time to time, but the work of government to solve water supply related problem was poor, even they are deteriorating from time to time. This shows that the efforts of the local government to solve water supply problem in the study area was not effective.

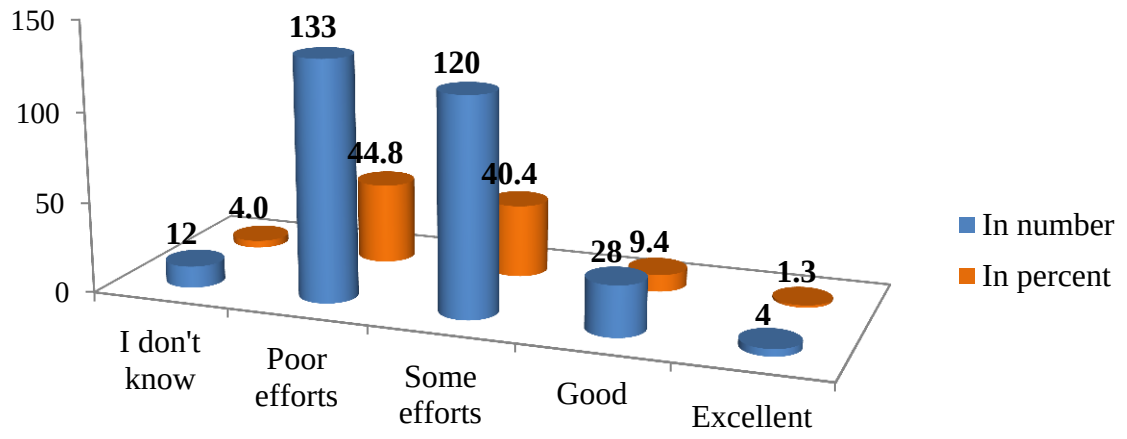

Figure 4:11: View of respondents on level of efforts in the local government to reduce domestic water supply problems

Source: Survey data, 2020

Eventually, respondents were interviewed about how they see solving the domestic water supply problem for the development of Mejo town, and about 9(3.0%) stated that as to some extent, 87(29.3%) reported as necessary and 201(67.7%) stated that as it is very necessary. Here, those who reported that as the solving of domestic water supply problem for the development of Mejo town is very necessary proportional dominate the others, showing that the need they have and development of the Mejo town.

Table 4:18: Progress of domestic potable water supply and way of solving supply problems

S. No	Variables	Frequency	Percentage
1	What do you say about the overall supply progress of potable water to satisfy the demand of the population at the present time		
	I don't know	23	7.7
	Decreasing	232	78.1
	Remain the same	23	7.7
	Increasing	19	6.4
	Total	297	100.0
2	If your answer for Q.37 is “decreasing”, what is the reason from administrative body should raise?		
	Some attention	59	19.9
	Less attention	165	55.6
	No attention at all	73	24.6
	Total	297	100.0
3	How do you see solving domestic water supply problem for the development of Mejo town?		
	To some extent	9	3.0
	Necessary	87	29.3
	Very necessary	201	67.7
	Total	297	100.0

Source: Survey data, 2020

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This research was mainly aimed at assessing potable domestic water supply and its socio-economic effects in Mejo town, Aroressa District of Sidama, Southern Ethiopia. In view of these objectives, it is concluded as follow.

The major source of domestic water in Mejo town was hand-dug well, the overall demand and consumption of water were not coincides with each other. The location of water source is inconvenient in relation to their home for majority of Mejo dwellers. The human beings are the major carriers of water from its source to home. The most common collector of water was housewife and young female children, and majority of respondents reported that as they cannot get sufficient daily piped water for household consumption, most of the respondents collect water after paying the money, more than $2/3^{rd}$ of study participants stated that as they have domestic water supply problems for household consumption, and which occur mostly in dry seasons. The situation of domestic water supply in Mejo town is inadequate.

The rapid population growth and urban expansion, financial insufficiency, lack of institutional capacity, insufficient water sources, frequent breakdown of pipeline and topography of the area were the main challenges of sustainable potable domestic water supply with justified reasons. Lack of sufficient water due to continuous interruption, frequent distribution problems, less attention of district concerning bodies' and lack of community participation and management were the main reasons for sustainable water supply problems. Unprotected spring water is the major source of water for fulfilling the water demand of households and followed by water from vendors.

High social and economic impact of water supply shortage was the serious problem in the Mejo town. Government is the responsible body for sustaining potable water supply in the Mejo town, and overall progress of potable water supply to satisfy the demand of the population in the town was stagnant. In addition, the level of efforts of the local government to reduce domestic water supply problems for the Mejo town was poor.

In general, the potable domestic water supply in the Mejo town was inadequate to the households and it has been affecting the town residents both economically and socially.

5.2. Recommendations

- Aroressa District Government and other concerned body should work to divert water source of residents from hand-dug well water to pipe line or public tap which is built at least within a distance of taking less than 15 minutes and should work to minimize the cultural influence on females that make them to carry all the activities in the household in the expense of their socio-economic development
- It is better if district and higher level government work on minimizing population growth, though coordinating with Woreda health office and provide family planning
- Consider enhancing the institutional capacity of water and energy office through financing, logistic supply, employing well equipped workers with adequate knowledge and skills who were selected through objective assessment.
- Considering quality of water during provision should be given due attention, distribution problems should be minimized, district office should give high attention to match the urban expansion with the development of water infrastructure of the town in line to bring the system near to the residences.
- Government of Regional State and lower level should work to minimize both social and economic impact of water supply problems, through creating awareness on improvement of the sanitation and hygiene problem, work on to minimize the incidence of communicable diseases and if incurred the diseases provide appropriate treatment services and mobilize the community on prevention activities
- The District Government and Trade and Industry office should work to control unbalanced cost of water in jerry cans and apply close monitoring on bottled water shopping and access to water service gives benefit through averting time cost, which may be used to work on other productive activity.
- District government should be increase ground water as well as new sources of water supply to the town such as deep shallow wells and reservoirs developed to increase the production capacity
- Regional and District Level Government should be minimize problem associated with water supply, search for adequate funds from government budget and official development assistance from donor countries and multilateral donors, to increase the potable water supply service of the Mejo town.
- Enhancing community participation to encourage potable domestic water supply directly and indirectly in the Mejo town.

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HAWASSA UNIVERSITY

SCHOOL OF GOVERNANCE AND DEVELOPMENT STUDIES

DEPARTMENT OF DEVELOPMENT MANAGEMENT

APPENDIX-I: HOUSEHOLD SURVEY QUESTIONNAIRE

Dear respondent,

My name is **Assefa Admasu.** I am a student of Hawassa University Schools of Governance and Development Studies. This survey questionnaire is prepared as an instrument to conduct an academic research for the fulfillment of Masters of Art Degree (M.A) in Development management. The main purpose of this study is to generate facts on **potable domestic water supply and its socio-economic implications in the case of Mejo Town Aroressa District Sidama Southern Ethiopia.** Hence, the questionnaire attempts to assess the provision and challenge that constrain potable domestic water supply and its effective performance. You are will select as one of the respondents to participate in this study. Therefore, your truthful response will be essential for the effectiveness of the study. All information you provide for this academic issue will be treated confidentially and only used for the academic purpose.

Thanks to your advance for your kindly cooperation and dedicating your time!

General Instructions: Please circle the number representing respondent's responses from given alternatives or fill in the spaces provided for open-ended items briefly. Your responses should be as honest as possible and use any language of the three: English, Amharic, and Sidaamu Afoo to responses short and precise for open-ended questions.

I. Kebele----------Date of interview----------Name of enumerator---------

II. Do not need to write your name---------- Respondent/References Code---------

Please take the time to read each statement carefully and respond with your honest feedback.

Section One: Respondent Background and Socio-Economic Information:

1. Sex: 1) Male 2) Female

2. Age: ----------year?

3. Educational level of household head: 1) Not educated 2) Primary school (1-6) 3) junior school (7-8) 4) high school (9-12) 5) Certificate/Diploma 6) Degree and above

4. Marital status of household head: 1) Single 2) Married 3) Divorced 4) Widowed

5. Household size ----------in number?

6. Main occupation of the respondent 1) Farming 2) Business man 3) Government employee 4) Daily laborer 5) If other, specify ----------

7. For how many years you have lived in Mejo town? Please put year----------

8. How much your monthly income state in Ethiopian birr? ----------

Section Two: the current situations of potable domestic water supply in the area

9. Where do you obtain domestic water source for your household purposes?

1) Piped household connection 2) Public water tap 3) Hand-dug wells/spring 4) pond 5) River/stream 6) Rainwater collection 7) Shallow wells 8) If others, specify----------

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10. How do you see the location of the water source with respect to your household?

1) Very inconvenient 2) inconvenient 3) Fair 4) Convenient 5) Very convenient

11. How do you transport water from the source to home?

1) Human load 2) Donkey 3) Animal pulled cart 4) If other, please specify----------

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12. Who is responsible to collect domestic water in your households?

1) Husband 2) Wife 3) Female child (under 18 years) 4) Male Child (under 18 years) 5) if other, specify

13. How much water do you need and consume for your household on the following activities? Please specify in liters/ jerry can

Domestic water used activities	Demand of water number of per liters/day/household		Consumed water number of per liters /day/household	
	In rain season	In dry season	In rain	In dry season
Drinking				
Cooking				
Washing clothes				
Personal				
House tools washing				
House cleaning				

If others, specify----------

---

14. Do you face domestic water supply problems for your household consumption?

1) Yes 2) No

15. If your answer for **Q.**14 is "**yes",** in which season was the domestic water supply problems mostly occur? 1) Dry season 2) Rainy season 3) Both seasons

16. How do you acquire access to water use in dry seasons? Please specify----------

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17. How do you acquire access of water in rainy season? ----------

---

18. Do you get daily piped water access for your household domestic consumption?

1) Yes 2) No

19. If your answer for **Q.**18 is "**No"**, how often do you get piped water access?

1) Once in 2-3 days 2) once in 4-5 days 3) Once in 6-7 days/weekly 4) Didn't get daily piped water

20. How many times do you fetch water per day? 1) Once a day 2) Twice a day 3) Three and above 3 times a day

21. Do you pay the money for the water services? 1) Yes 2) No

22. If your answer **Q**.21 is "**yes"**, how much (Eth. birr) pay a monthly----------

----------If An. is **no**, jump it

23. Do you buy the water for your household consumption? 1) Yes 2) No

24. If you buy water outside your house, how much do you pay (on the average) for one Jerry can of water? Put here by (Eth. Birr/Cents) ----------

25. For what purpose(s) do you face serious domestic water shortage in your households?

1) Drinking 2) Washing clothes 3) Cooking 4) Bathing 5) Flush toilet 6) if others, specify----------

26. How much time spent do you take to get the water?

1) Within 5 minutes 2) 5-30 minutes 3) 30 minute-1hours 4) greater than an hour's

27. How did you rate the situation of potable domestic water supply general in your households?

1) Bad 2) Inadequate 3) Average 4) Good 5) Adequate

Section Three: Challenges of sustainable potable domestic water supply in the area

28. What are the challenges of the sustainable potable domestic water supply in your area? Specify the degree of agreement and disagreement by putting "X" mark in front of each item under the following five Likert scale: Strongly disagree= 1, Disagree=2, Neutral=3, Agree=4, strongly agree=5 and give your responses.

No	Challenges of sustainable potable domestic water supply	Likert scales				
		1	2	3	4	5
28.1	Rapid population growth and town expansion					
28.2	Financial insufficient/limited budget					
28.3	Lack of institutional capacity					
28.4	Insufficient water sources					
28.5	Frequent breakdown of pipe line					
28.6	Topography of the area					

29. Please specify the main reasons to sustainable domestic water supply problems in your area?

No	Reasons to sustainable potable domestic water supply problems	Likert scales				
		1	2	3	4	5
29.1	Lack of sufficient water due to continuous interruption					
29.2	Lack of sufficient water due to frequent distribution problems					
29.3	Less attention of district concerning bodies'					
29.4	Lack of community participation and management					

If others, specify ----------

30. How can you fulfill your water demand? 1) By using river water 2) By using unprotected spring water 3) By using from water venders 4) If other, specify----------
---

Section Four: Impacts of the potable domestic water supply shortages on the household socio-economic consequences

31. The shortage of potable domestic water supply brings social and economic impacts on you and your family? Please specify the degree of agreement and disagreement by putting "X" mark in front of each item under the following five Likert scale: Strongly disagree= 1, Disagree=2, Neutral=3, Agree=4, strongly agree=5

No	Types of impact due to domestic water shortage on socio-economic consequences	Likert scales				
		1	2	3	4	5
31.1	**Social related impacts**					
31.1.1	Incidence of water borne disease like typhoid fever, typhus, diarrhea, cholera					
31.1.2	Brings Sanitations and hygiene problems					
31.1.3	Children school drop out					
31.1.4	Late children from school attend time					
31.1.5	Walking for long distance to collect water					
31.1.6	Tiredness of carrying water					
31.2	**Economic related impacts**					
31.2.1	Brings unbalanced cost purchasing water in jerry cans					
31.2.2	Brings unbalanced cost purchasing bottled water					
31.2.3	Brings high water costs					
31.2.4	Slowing down economic development activities					

32. If the occurrences of the water born disease how much money you spent per year for medical purposes to (all your family)? ----------
---
---

33. What was the degree of impacts of domestic water supply shortage brings on your household socio-economic consequences? 1) Very low 2) low 3) moderate 4) high 5) very high

Section Five: The roles of the local government to sustain potable domestic water supply in the area?

34. Who are responsible for sustain potable water supply in your town?

1) Government 2) NGOs 3) Community based organizations 4) if others, specify--------

---

35. If your answer for **Q**.34 is "**1**", which government institution provides water in your area? 1) Municipality 2) Water, Mines and Energy Office 3) Kebele administration 4) Woreda Administration

36. What do you say about the overall supply progress of potable water to satisfy the demand of the population at the present time?

1) Decreasing 2) Remain the Same 3) Increasing 4) I don't know

37. If your answer for **Q**.36 is "**decreasing**", what is the reason from administrative body should raise?

1) A lot of attention 2) Some attention 3) Less attention 4) No attention at all

38. If your answer for **Q.**37 is "the **same or increasing",** explain how? ----------

---

---

39. How do you see the level efforts of the local government to reduce domestic water supply problems for your town?

1) Poor efforts 2) Some efforts 3) Good 4) Excellent 5) I don't Know

40. How do you see solving domestic water supply problem for the development of Mejo town? 1) Nothing 2) to some extent 3) necessary 4) very necessary

41. State your general feeling about the domestic water supply service of the town to ensure safe, adequate and improved water for all households----------

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Thank you so much for your time and cooperation!!

APPENDIX-II

Focus group discussion (FGD) Guideline on water supply in Mejo town selected HHS

Dear discussion participants, this discussion is meant to **assess the potable domestic water supply and its socio-economic implications in the Mejo town.** 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.

1. What are the main sources of domestic water supply to town?
2. Do you get daily piped water access for your domestic household consumption? If, not specify it?
3. For how many days of a week do you receive water?
4. Do you think that, the sources of water supply have a reasonable access and adequacy to town dwellers?
5. What are the major challenges in providing improved domestic water supply of the town?
6. For which season of the year do households face serious problems on domestic water supply?
7. Is the water sufficiently good for potable domestic purposes? If not, please state why?
8. Is the potable domestic water shortage brings social and economic impacts on your area? If yes, Please specify it how?
9. How do evaluate the capacity of the local government to potable water supply in Mejo town?
10. What measures should be taken to overcome the problems?
11. What do you say about the overall domestic water supply and its progress of pipe water to satisfy the demand of the population at the present time and for the future?

Thank you for your cooperation and participation!!!

APPENDIX-III

Key Informant Interviews (KIIs) Guideline on water supply in Mejo town selected leader

Dear interviewee, this interview is meant to **assess the potable domestic water supply and its socio-economic implications in the Mejo town.** To that effect, I would like to assure you that all information gathered was 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.

Interview guideline questions for Mejo town Water, Mines and Energy Office head

1. How do you evaluate the potable domestic water supply of the Mejo town?
2. How many households have access and do not have access to improve water sources to domestic purposes?
3. Is there any attempt to improve the water supply of the town?
4. What factors accountable for the problem of water supply accessible and safe?
5. Is there any other institution which works on water provision in the town?
6. What do you think the demand and supply condition of improved water supply to the households?
7. What are your limits in the process of implementation of sustainable water supply in the town?
8. What are potable water policies or principles? To what extent your organization is implementing these policies?

Interview guideline questions for Municipality, health and Kebele Administrators

1. What do you think about potable domestic water supply provision of the town? Justify it
2. Is there demand and supply of the water for the household service matched in the town?
3. Are you working in integration with the water, mines and energy office to improve the water services delivery? 1) Yes 2) No
4. If your answer Q3 is yes, please elaborate how?
5. If your answer Q3 is No, please specify why?
6. If you are working with them what challenges do you face?
7. Is there creates impacts of the social and economic progress in your area?

8. Are there cases of disease in relation to water related problems? If it is yes?

9. How many cases receive in this year related to water problems?

10. Is there any attempt to improve hygiene facility of the town?

11. Suggest the possible solutions to improve the potable water supply systems in the areas?

Thank you so much for your time and cooperation!

APPENDIX- IV

Checklist for field and HHs survey observation

1. What is the current status of potable domestic water supply in the town?

2. Is/ are it/they enough to meet the current and future water demand of the town?

2. What is /are the sources of water in the town?

3. Is /are there water supply interruptions in the town? How often and how long?

4. Who are mostly going to fetch domestic water?

5. How long are they travelled to fetch domestic water?

6. How much time spends by waiting a queue at water sources?

7. What types of containers used to fetch water?

8. What looks like the duration of opening time of pipes for users?

9. What look like the effects of water shortages on social and economic situations?

Thanks once again!

Qa'misaancho 1

Hawaasi Uyiveriste

Gashshootu Rosi Minenna Latishshu Xiinxallo

Lophote Gashshooti Rosi Gola

Ayirraddu Tumo qoltinaniri

Ane su'ma'ya Assaffa Adimaasu yinanni"e, Hawaasi uyiversitera gashshootu rosi minenna latishshu xiinxallo rosaanchooti. Konni rosi mine 2ki digire rosaanchooti. Tenne xiinxalloti qara mixo (somi) Arooreessu woradi Majo quchumira mini giddo horoonsi'nanni wayi shiqo qarrira korkaata ikkitanno mitiimma tiratenni furgao abate doogga hasate. Konnira tenne qarrubba lainohunni mashalaqqe gamba assate ki'newiinni afi'reemmo dawaro addinta raga kultannota ikkitino daafira konni woroonni shiqqino xa'mubbara dawaro ikkitanno yitinannita xa'mote garinni dawartinanni gede shaqqillunni xa'mireemmo'ne.

Hajajo: Tenne borrote xa'mubba woraqati aana su'ma'ne borreessitinoonte.

Kifile Mite: Xa'mamaanote Konni Badhiidi Tajenna Dagoomittete Jiro

1. Koo/tee 1/ Labbaho 2/ Meyaate
2. Diro: ----------
3. Minaanniha/maha rosu deerra 1/ Dirosinoho/Te 2/ U/D/R(1-6) 3/ L/D/R(7-8) 4/ Lowiidi D/R(9-12) 5/ Sertifikeete/ Dippolooma 6/ Digirenna ale
4. Minaanniha/maha adhammete gara
   1/ Di"Adhinoho/ di"adhanitinote 2/ Adhinoho/adhantinote
   3/ tirinoho/Tirtinote 4/ Gunnichaho/Gunnitete
5. Maatete batinye ---------- kiirotenni.
6. Xa'mamaanchunniha/chonniha qara looso 1/ Loosi're Galinoho/ loosidhe galtinote 2/ Daddalaanchoho/te 3/ Mangistete loosaasinchooti 4/ Barru loosinni hee'rannoho/heedhannote/wolqate looso loose hee'rannoho/dhannote
   5/ wolu loosi nooro xawisi ----------
7. Majo quchumira mageeshshi diro keeshshootto/tta? ----------
8. Aganunni afi'ratto /tta e"okki mageeshshaati? ----------

<u>Kifile Lame:</u> Xaa Yannara Mini Giddo Horoonsi'nanni Waa Afi'nanni Doogo

9. Mini giddo horoonsidhinanni waa afidhinannihu mamiinniiti? 1/ Boombete waa miniyanni 2/ Dagate waa 3/ Wolqatenni fushshinanniha balate/ mincette waa 4/ Kofo 5/ Xashsho 6/ Xeenu waa 7/ Dunnamanno waa 8/ Wolu nooro xawisi ----------
10. Wayi bu"e woy fulanno bayichi ate la"onni hiittooho? 1/ Lowo geeshsha di"injiinoho 2/ Di"Injinoho 3/ Ikkadoho 4/ Injinoho 5/ Lowo geeshsha injinoho
11. Waa bu"esinni minira hiissine abbinanni? 1/ Mannu wolqanni 2/ Harrete wolqanni 3/ Saada goshooshshanno gaarenni 4/ Wole nooro xawisi -----
12. Mini giddo horoonsi'nanni waa abbannohu ayeeti? 1/ Minaannaati 2/ Minaamaati 3/ Seenneho 4/ Labballoho 5/ Wolu nooro xawisi ---
13. Konni woroonni noo shae giddo mini giddo loosira horoonsi'nanni wayi mageeshshihoro xawisse.

Waa horoonsi'nanni loossa	**Wayi hasatto liitiretenni**		**Horoonsi'nanni geeshsha liitiretenni**	
	Xeeni yannara	**Arri yannara**	**Xeeni yannara**	**Arri yannara**
Agate				
Sagale loosi'rate				
Imana hayishshi'rate				
Biso hayishshi'rate				
Mini uduunne hayishshi'rate				
Mine hayishirate				

Wolu nooro xawisi ----------

14. Mini giddo horoonsidhinanni wayira qarru xaade egennino'neni? 1/ Ee 2/ Dee'ni
15. 14ki xa'mora dawarokki Ee ikkitinoro, hiitte yannaraati wayi qarri xaadannohu? 1/ Arro 2/ Hawado 3) Lamente Yannara
16. Arri yannara waa hiittoonni afidhinanni? Ballo xawisi ----------
17. Hawadi yannaranaa waa afidhinannihu hiittoonniiti? ----------

18. Barru tuqa boombete waa mini giddo horora afidhinanni? 1/ Ee 2/ Dee'ni
19. 18ki xa'mora dawarokki Dee'ni ikkitinoro ma yannaraati boombete waa afidhinannihu?
    1/ 2-3 barri giddo mitteenge 2/ 4-5 barri giddo mitteenge
    3/ 6-7 barri giddo mitteenge 4/ barra tuqa di"afi'neemmo
20. Barrunni me"e hinge waa hinkii'linanni? 1) Barrunni mite hige 2) Barrunni lame hige 3) Barrunni sasenna hakkuyi ale
21. Horoonsidhinanni wayi batooshshu nooho? 1/ Ee 2/ Dee'ni
22. 21ki xa'mora dawarokki Ee/ nooha ikkiro mageeshshi birra/ womaashsha aganunni baattinanni? ----------
23. Mini horora ikkanno waa hidhitinannini? 1/ Ee 2/ Dee'ni
24. Mini gobbaydinni waa hidhitinanniro, mittu jaarkaanira/ qumbira me"e birra baattinanni? ----------

25. Mini giddo horoonsi'nanni wayi rorre qarrubba ma assinanna xaaddanno?

1/ Anganna 2/ Uduunne hayishshi'nanna 3/ Sagale ra"isi'nanna 4/ Biso hayishshi'nanna 5/ Shumate mine hayishshinanna 6/ Wole nooro xawisi ----------
---

26. Mini giddo horoonsi'nanni waa afi'ra mageeshshi yanna adhitanno? 1/ onte daqiiqa
    2/ 5-30 daqiiqi geeshsha 3/ 30-1 saate geeshsha 4/ mitte saate ale
27. Heedhinanni quchumira mini giddo horoonsidhinanni wayi shiqo hiittoote? 1/ Bushate 2/ Di"ikkadote 3/ Mereerimate 4/ Danchate 5/ Ikkadote

<u>Kifile Sase:</u> Mini Giddo Horoonsi'nanni Wayi Shiqora Qarra Ikkitinore

28. Mini giddo horoonsi'nanni wayira danqara ikkitino mitiimmuwa geeshsha sumuu yaakkinna hoogakki konni woroonni noo shae giddo borreessinoonni xa'mo albaanni **"X"** malaate qolle.

Xawishshu deerra: **lowo geeshsha sumuu yaa hoogate 1, sumuu yaa hoogate 2, mereerimate 3, sumuu yaate 4, lowohunni sumuu yaate 5**

A.k	Mini giddo horoonsi'nanni wayi shiqo danqara	Xawishshu deerra				
		1	2	3	4	5
28.1	Wiinantino dagate kiiro lexxanna quchumu					
28.2	Womaashshu anje					
28.3	Uurrinshuwate hoonge					
28.4	Wayi bu'a anje					
28.5	Boombete hiiqqama					
28.6	Baattote ofolla					

Wole nooro xawisi ----------

29. Ballo qarra koruwa mini giddo horoonsi'nanni wayi qarra ikkitinore xawisse woy leellishshe

A.k	Mini giddo horoonsi'nanni wayi shiqo qarrira qara koruwa	Xawishshu deerra				
		1	2	3	4	5
29.1	Ikkadu wayi anje uurritannokki muramanni					
29.2	Ikkadu wayi anje beehate qarri korkaatinni					
29.3	Coyi la"annonsa bissa illacha tuga hooga					
29.4	Dagate beeqqonna gashshootu xukku anje					

Wole nooro xawisi ----------

30. Mini giddo horoonsidhinanni wayi hasatto hiittoonni wonshidhinanni? 1/ Xashshu waa horoonsi'ratenni 2/ Agaraminokki waa horoonsi'ratenni 3/ Waa qarqarisinni horoonsi'ratenni 4/ Wole nooro xawisi ----------

<u>Kifile Shole:</u> Mini Giddo Horoonsi'nanni Wayira Xaaddanno Anje Dagate Miinji Aana

31. Mini giddo horoonsi'nanni wayi anje dagatenna dagoomu miinji aananna maatekkira iillishshanno qarra konni woroonni noo shae giddo sumuu yaakkinna hoongekki xa'mote albaanni "**X"** malaate woratenni qolle.

Xawishshu deerra**:**

lowo geeshsha sumuu yaa hoogate 1,

sumuu yaa hoogate 2,

mereerimate 3,

sumuu yaate 4,

lowohunni sumuu yaate 5

A.k	Mini giddo horoonsi'nanni wayi shiqo danqara	Xawishshu deerra				
		1	2	3	4	5
31.1	**Dagoomaho xaaddanno qarrubba**					
31.1.1	Wayinni lawaabbanno xiwanna hakkurino: tayfoyde, tayfese, deeu, kolleeru w.k.l					
31.1.2	Biso hayishshi'ratenna keeraanchimmate					
31.1.3	Rosaano rosonsa murate					
31.1.4	Rosaano rosinsa yanna barrisi'ra					
31.1.5	Waa abbate seeda doogo hara					
31.1.6	Waa duhate daafuro					
31.2	**Miinjaho xaaddanno qarrubba**					
31.2.1	Taalinokki waaga/baatooshshe jarkaanaho					
31.2.2	Taalinokki waaga/ baatooshshe tu"amino wayi					
31.2.3	Wayi waaga /baatooshshe leddanno					
31.2.4	Miinju lopho badhera qoltanno					

Wole nooro xawisi ----------

32. Wayi korinni lawaabbanno xiwannara dirunni mageeshshi womaashsha xaggate baattinanni? ----------
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33. Mini giddo horoonsi'nanni wayi shiqo anje dagoomu miinji aana iillishshanno riico/ ruukko mageeshshite? 1/ Lowohunni shiimate 2/ Shiimate
3/ Mereerimate 4/ Jawate 5/ Lowohunni jawate

<u>Kifile Onte:</u> Qarqaru Gashshooti Mini Giddo Horoonsi'nanni Wayi Shiqora Noonsa Qeecha

34. Mini giddo horoonsi'nanni waa quchumaho shiqishate annimma ayeete?
1/ Mangistennite 2/ Mangistaawe ikkitinokki uurrinshite

3/ Dagooma mereersitino uurrinshuwate 4/ Wole nooro xawisi ----------

35. 34ki xa'mora dawarokki 1tete nootero, hiikkonne mangistaawe uurrinshaati waa shiqishannohu? 1/ Quchumaho 2/ Wayi, shiilonna wolqate borro mineeti 3/ Olluu gashshooteeti 4/ Woradu gashshooteeti
36. Mini giddo horoonsi'nanni wayi shiqo lophora, xaa yannara dagate xa'mo la"inohunni xaphoomunni la"okki mageeshshite? 1/Ajjinote 2/ Xaanno taaloho 3/ Lexxitinote 4/ Di"afoommo/mma
37. 36ki xa'mora dawarokki Ajjinote yitannotero, gashshootu bissa kayissanno la"ooshshi maati hiittooho? 1/ Lowohunni illacha tugeeti 2/ Boode illacha tugeeti 3/ Ajino illacha tugeeti 4/ Illacha ditugeemmo/mma
38. 37ki xa'mora dawarokki taalote woy lexxitinote yitannotero, hiittootiro xawisi ----------
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39. Qarqaru gashshooti, mini giddo horoonsi'nanni wayi shiqo qarra ajishate assitanno sharro hiittoonni la"atto/tta? 1/ Ajjinote 2/ Boodete 3/ Danchate 4/ Lowo geeshsha danchate 5/ Di"afoommo/mma
40. Majo quchumira mini giddo horoonsi'nanni wayi qarra tira hiittoonni la"atto/tta?
1/ La"ooshshu dino"e 2/ Hoodunni la"eemmo/mma
3/ Hasiisannoho 4/ Lowo geeshsha hasiisannoho
41. Mini giddo horoonsi'nanni wayi agaraminoha, ikkadonna woyyaawinoha ikkate xaphooma hedokki xawisi ----------
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Uyitinoonni"e yannaranna xaadooshshi'ne daafira galateemmo'ne!

Annex-1

Independent Sample Test

Statistically association between overall water consumption and among sex of household

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	T	Df	Sig. (2-tailed)
Between Groups		.350	.455	295	.650
Within Groups	.876		.458	293.778	.647

ANOVA-table

Statistically association between overall water consumption and age category

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	638.449	4	159.612	2.094	.082
Within Groups	22253.957	292	76.212		
Total	22892.406	296			

ANOVA-table

Statistically association between overall water consumption and among education status

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	588.401	5	117.680	1.535	.179
Within Groups	22304.005	291	76.646		
Total	22892.406	296			