ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATES

CENTER FOR ENVIRONMENT AND DEVELOPMENT

Assessment of Water Supply and Sanitation Facility in Addis Ababa. The case of Gulele Sub-City.

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College of Environment & Development Studies

This is to certify that the thesis prepared by Yonas Melese Mekasha entitled "Assessment of Water Supply and Sanitation Facility in Addis Ababa. The case of Gulele Sub-City" is submitted in partial fulfillment of the requirements for the Degree of Master of Science in Water Resource Management complies with the regulations of the University and meets the accepted standards with respect to its originality and quality.

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I, the undersigned researcher, would like to declare that this thesis is my original work and has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

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Abstract

Access to safe water and sanitation facility has lately become a luxury in the capital city Addis Ababa, specifically in the slum areas. Drinking water should be available in sufficient quantities at all times, it is unlikely that in the short term all countries can attain that level of service. Where services are unreliable or intermittent, households typically store water to ensure that it is available when needed. They may also restrict their consumption when water sources are far away, available only for a few hours a day or at certain times of the year, or out of service.

The objective of this study was to assess the water supply and sanitation facility of Gulele Sub-city selected woredas and come up with the possible recommendations that will improve and ensure the sustainability of the water and sanitation facilities of the area. Accordingly, the study area was selected based on the vulnerability of the area for WASH facilities and the researcher's prior exposure. To make this particular research more practical and tangible, the methodology had focused on the conceptual framework formulated based on Water Availability, Water Accessibility, Quality of Water Supplied, and Sanitation Facility. To achieve the objectives and explain the research scenario, a descriptive survey research method was adopted. Besides, both qualitative and quantitative approaches were adopted.

The 120 households survey results living in Gulele sub-city slum areas indicated that 69% of the households have a piped water connection and 17% of main water sources are public taps, and the remaining 14% get water from other water sources. The households receive highly interrupted and the availability of water was on average 1 day per week with an average duration of less than 6 hours per day. Regarding its quality, 65% said the water is

unacceptable and has a color. Concerning sanitation, the majority, 92% have a dry pit latrine and they don't have a fixed handwashing facility. In these toilets, on average one latrine serves 12 people. On top of that, the septic tank is discharged to an open drain and it has a leakage most of the time, which can eventually affect the health of the community.

The study indicated that the dwellers are highly dissatisfied with the current water and sanitation service delivery characterized by long time persistent problems. The concerned government bodies are expected to take immediate action to solve these problems, otherwise, the current situation which is affecting the health and economic status of the community will intensify. In this study, it was identified that the major causes of the lack of adequate water supply in the area were the shortage of supply, the connectivity problem, population growth, topography, and enhanced economic activity.

In this research, short-term and long-term recommendations were forwarded, which includes the development of policies on targeting the slum areas. Besides, uninterruptable distribution of water, efficient management of public taps, and toilets on the existing infrastructure as well as its rigorous maintenance should be addressed in the short term.

Key Words: Water Availability, Accessibility, Quality, Sanitation, Slum Areas

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TABLE OF CONTENTS

Contents Page

List of Figures and Tables Page

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

AACRA	Addis Ababa City Roads Authority
AAWSA	Addis Ababa Water and Sewerage Authority
BCC	Behavioral Change Communication
CLTSH	Community-Led Total Sanitation and Hygiene
COVID-19	Coronavirus Disease 2019
CSA	Central Statistical Authority of Ethiopia
CVM	Contingent Valuation Method
DALYs	Disability-adjusted life-years
EEPCO	Ethiopian Electric Power Corporation
FDRE	Federal Democratic Republic of Ethiopia
GTP	Growth and Transformation Plan
HHs	Households
JMP	Joint Monitoring Program
MoA	Ministry of Agriculture
MoWIE	Ministry of Water, Irrigation, and Energy
NGO	Non-Government Organization
OD	Open Defecation
OWNP	One WASH National Program
SDG	Sustainable Development Goal
SSA	Sub-Saharan Africa
UN	United Nations
UNICEF	United Nations Children's Fund
WASH	Water Sanitation and Hygiene
WHO	World Health Organization
WSS	Water Supply and Sanitation
WSSA	Water Supply and Sanitation Authority

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Two in five of the world population still lack adequate basic sanitation. Globally, the United Nations estimates that about 2.4 billion people use unimproved sanitation facilities, and fewer than one billion people (946 million) practice open defecation (JMP,2015a). This public health challenge has persisted for decades, despite its direct impact on human development: increased incidence of disease and death, chronic poverty, environmental degradation and the paths of opportunity through education has been blocked. Furthermore, the separate recognition of the rights to water and sanitation provides States a policy instrument with which to focus more attention and effort on their obligations related to sanitation. (Giné-Garriga R et al 2016)

Ethiopia's geographical location and its endowment with favorable climate provide a relatively higher amount of rainfall in the region. However, flows across the borders being carried away by the transboundary rivers to the neighboring countries, like Sudan and Egypt. Although we cannot be definite due to lack of researched data as yet, preliminary studies and professional estimates indicate that the country has an annual surface runoff of close to 124 billion cubic meters of water excluding groundwater. (OPENWASH 2016)

In Ethiopia, not only is the total population growing fast, but it is also on the massive migration. Many people are moving away from rural areas and into towns and cities, resulting in an increase in the urban population. The movement of people from rural to

urban settings is becoming a major issue. These people arrive in need of somewhere to live, and although there are many signs of economic growth and development in urban areas, it is a challenge for towns in Ethiopia to absorb migrants from the rural parts of the country and to provide them with adequate housing. The current stock of urban housing is both insufficient and of poor quality. Only 27% of the urban population has access to improved sanitation, with another 42% using shared facilities, leaving 31% with unimproved or no latrine access (JMP, 2014). The serious deficiencies in sanitation services and random defecation in urban areas have created dangerous health and environmental problems. (FAO 2016)

The capital city, Addis Ababa still has a long way to go when it comes to delivering potable water. The City's Water and Sewerage Authority can only be able to deliver below 75% of water demand for the estimated 5 million inhabitants in which most of them get through rationing. Gulele Sub-City is one of the sub-city in Addis Ababa divided into 10 administrative woredas. These woredas are known for their inadequate water supply and sanitation facilities. The population growth followed by an increasing informal settlement is the feature of the woredas. This led to a big challenge for the sub-city to deliver adequate water supply and sanitation facilities in the area. Also, the dweller's knowledge and attitudes towards WASH is very low compared to the other areas. Therefore, in order to reduce this situation and to achieve efficient water supply and sanitation facilities, a detailed study of the existing condition was required.

1.2 Statement of the Problem

Currently, about 1 in 2 people is an urban dweller and by 2030 about 60% of the population are expected to live in cities, partially contributing to an expected water consumption increase of 55% by 2050. In addition, low-income countries are expected to be the most affected by climate change and the impact on securing water resources. Sub Saharan and eastern Africa countries are particularly exposed to climate change impacts. Ethiopia is one of the Horn of Africa countries which is currently most exposed to droughts. It follows that rapidly expanding urban areas in lower-income countries face considerable water supply and sanitation challenges soon. Addis Ababa, Ethiopia, is no different. The city is the home to more than 25% of the urban population of Ethiopia and is one of the fastest-growing cities in Africa. (Yonas T et al. 2018)

Delivering tap water is the primary task of the city's Water and Sewerage Authority. Because of the inability to meet resident's demand for potable water; the Authority has begun rationing and delivers water by tankers to the mountainous part of the city. The capital city, Addis Ababa still has a long way to go when it comes to delivering potable water. The City's Water and Sewerage Authority can only be able to deliver below 75% of water demand for the estimated 5 million inhabitants in which most of them get through rationing. The 132-years-old city is only able to cover two-thirds of demand by supplying 575,000 cubic meters of potable water to its inhabitants on a daily basis. (Astatike D 2019)

Concerning sanitation, a population exceeding 5 million, only 10% of Addis Ababa residents are connected to the sewerage system and an estimated 10% continue to practice open defecation. These situations necessitated research work to look at the issues in the

area closely and deeply to give a clear description of the problems from various urban dwellers an administrator's point of view. Also, new construction to meet the demands of urbanization may not solve these problems. In Addis Ababa and other cities in Ethiopia, many condominiums and other housing are being built to provide accommodation for the growing urban population. Rapid construction without adequate planning procedures can mean that buildings are erected without having the necessary infrastructure in place, i.e. water supply and sanitation may not be part of the construction or maybe inadequate or delayed. Poorly designed buildings can be short-term solutions to meet the pressing need for more housing, but they will not be sustainable. These are the growing challenges that the OWNP in its future implementation will need to take into account. (OPENWASH 2016)

Gulele Sub-City is one of the ten sub-cities in Addis Ababa and divided into 10 administrative woredas. Almost all the woredas are known for their inadequate water supply and sanitation facilities. The rapid population growth followed by an increase of slum areas and informal settlements are the feature of this sub-city. This led to a big challenge for the sub-city to deliver adequate water supply and sanitation facilities in the area. Besides, the dwellers' knowledge and attitudes towards WASH were very low compared to the other areas.

From the point of residents in the slum area, the attention from the municipality side and the interrupted water supply and poorly constructed public latrines challenge the day to day activities. The rationed water is inconsistent and sometimes interrupts without prior notification. Recently following the newly constructed asphalt road the water shortages

become severe, and the community is suffering a lot, particularly peoples who are living in slum areas. The efforts made by the sub-city administration to change the situation are also insufficient when compared to the extent of the problem.

Some studies have been conducted on access to water supply in the sub-city, however, access to water supply and sanitation facility in the slum areas are not intensely observed. There is a lack of adequate information that informs about the current water supply system and sanitation facility at the household level. Henceforth, this study analyzed the existing facts of the water and sanitation facilities. And then, forwarded a viable recommendation based on the actual findings.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this research was to assess the water supply and sanitation problem in the selected sub-city and come up with possible recommendations that will improve and ensure the sustainability of water supply and sanitation facilities of the slum areas.

1.3.2 Specific Objectives

1. To assess the selected three woredas water supply and sanitation facilities concerning availability, accessibility, and quality.
2. To explore the possible causes in providing water and sanitation services
3. To understand the selected household's level of satisfaction in the slum areas.
4. To draw up a recommendation for facility improvement

1.4 Research Questions

To achieve the intended objectives stated above, the following research questions were formulated.

1. What are the major challenges in the provision of water and sanitation facilities in the selected woredas?
2. What are the impact of inadequate water supply and sanitation on the life of the slum area community?
3. What are the main reasons for the slum area woredas communities' dissatisfactions?
4. What measures should be taken to ensure sustainable water supply and sanitation services in the selected woredas?

1.5 Significance of the study

The researcher believed that this study may have three main significances. First, it may give some guideline information to policymakers, Woreda WASH experts, and Addis Ababa Water and Sewerage Authority (AAWSA). Secondly, assessing both water and sanitation gives the full picture of the slum areas challenges than dwelling in a specific area. Third, it may serve as a baseline for other researches who would like to conduct detailed and comprehensive studies related to water and sanitation work.

1.6 Limitations of the study

This research doesn't represent the whole population of Addis Ababa or the Sub-city, rather it covers only three woredas that represent a selected Sub-city of the whole city. The other limitation that the researcher encountered was time constraint that hindered to looking at

the issue in a more detailed fashion. Besides, because of the recent phenomenon of COVID-19, the researcher couldn't go to the research area as per the plan and some households had a fear of interaction which caused an obstacle to properly communicate with the interviewee. Also, the absence of enough information from secondary sources due to unwritten and unorganized documents were the other constraints. Though hygiene is part and parcel of the WASH component, but this research work was limited to water and sanitation facilities only. Perhaps, the researcher overcomes these problems by creating alternatives to finalize the research work, and successfully finalized the intended research work.

1.7 Organization of the Thesis

This paper is organized into five chapters. The first part is an introductory part of the paper. The second chapter deals with the review of related literature obtained from various published and unpublished reference materials. The third part of the thesis describes the methodology of the research. The fourth chapter is result and discussion which presents the analysis and its interpretation of the data, which is about the existing status and spatial coverage of water and sanitation practice, and institutional arrangements of sub-city. The last part of this study is chapter five which is the conclusion and recommendation. And finally, Bibliographies, pictures, and appendices were also attached at the end of the paper.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Urbanization and Its Threats

The world's population is becoming increasingly urban. As of 2018, an estimated 4 billion people, or 55 percent of the global population were living in urban areas. Nearly a third of those were children. An estimated 880 million of this urban population were living in the slums area, the worst form of urban informal settlement, and of the estimated slum population, nearly 300 million were children. Driven by poverty, economic opportunity, migration due to conflict, insecurity, climate change, water scarcity, disaster, or environmental degradation, the global urban population is expanding by approximately 220,000 every day, with most of this growth concentrated in Asia and sub-Saharan Africa. The United Nations estimates that by 2030, about 60 % of the world's population will be urban dwellers, and 68 % by the middle of the century. (UNICEF 2019)

Such changing demographics from rapid urbanization have not only dramatically increased the demand for water and sanitation services for a large and diverse urban population – they have also meant that a rapidly growing, vulnerable segment of the population is being left underserved. While figures show that overall WASH access and service levels are often much higher in urban areas than rural, these masks deep inequities in intra-urban access to WASH services. Economic status is one of the major determinants of service level, with significantly lower coverage for the poorest households. Inequalities within wealth quintiles for urban sanitation are striking; for example, in Kenya, the richest are over 30 times more likely to have access to basic sanitation than the poorest. (UNICEF 2019)

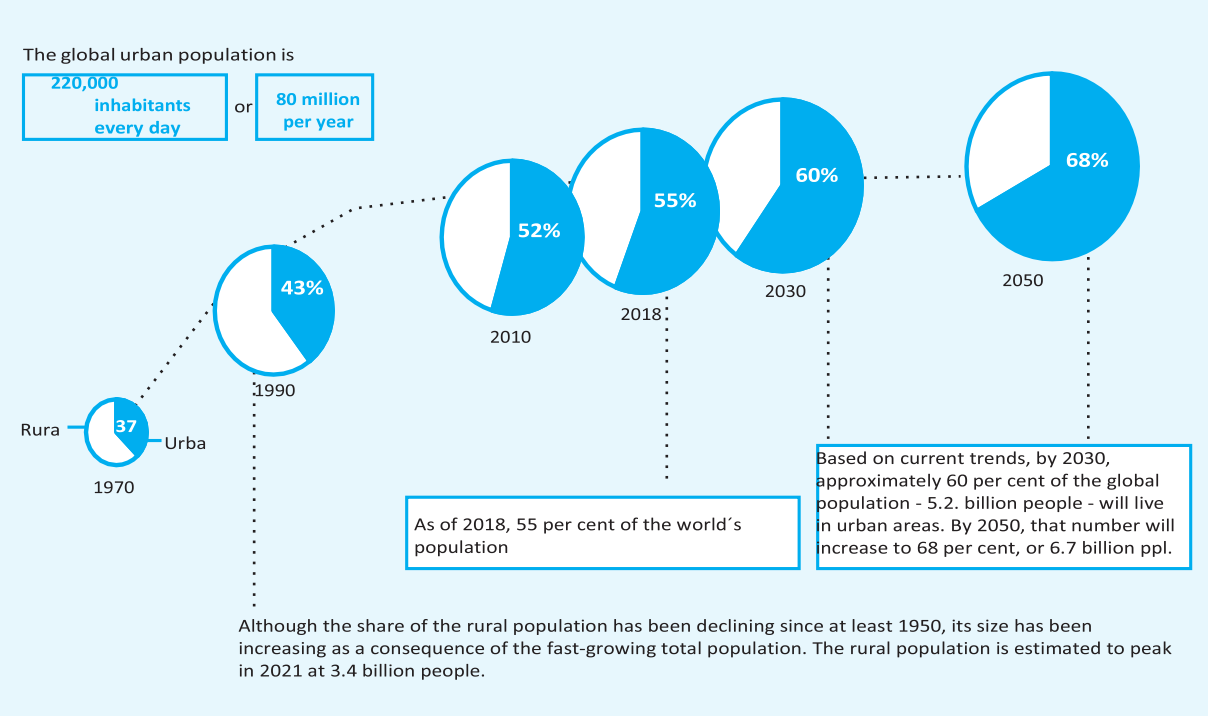

Figure 2. 1 Trends on Urbanization 1970 – 2050 (Source: UNICEF, New York, 2019)

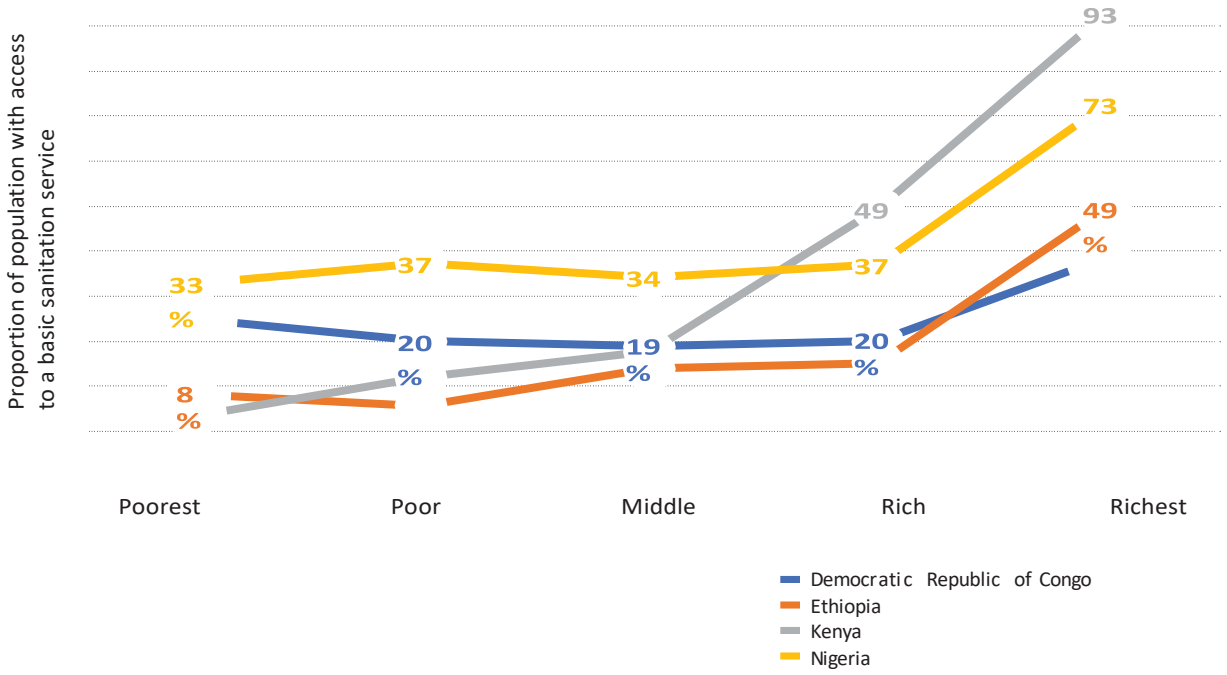

Figure 2. 2 Inequalities in urban sanitation coverage (Source: UNICEF, New York, 2019)

The 2019 WHO/UNICEF Joint Monitoring Program for Water Supply, Sanitation and Hygiene report on progress household drinking water, sanitation, and hygiene show that there was a slight improvement in access to at least basic water services in urban areas, from 95 % in 2000 to 97 % in 2017. However, a slight decline in access to safely managed water services from 86 % in 2000 to 85 % in 2017 was also observed. Some noticeable improvements can be observed in urban sanitation coverage. Urban populations with access to safely managed sanitation services increased from 36 percent in 2000 to 47 percent in 2017, and a similar increase could be observed in urban populations with access to at least basic sanitation, with 85 percent access in 2017 compared to 79 percent in 2000. Just 1 percent of the urban population were practicing open defecation in 2017, compared to 5 percent in 2000. Data about institutional WASH in urban areas is limited. However, a joint report from WHO and UNICEF in 2019 found that around 5 percent of health care facilities in urban areas had no water service; and 21 percent of health care facilities globally had no sanitation facilities. A 2018 JMP report on drinking water and sanitation in schools found limited data on urban schools. Findings from countries that could provide data showed that basic drinking water coverage was significantly higher in urban schools than rural schools in 2016 but estimated that around 11 percent of urban schools still had no drinking water service. It was not possible to calculate the proportion of urban schools with no sanitation service, due to a lack of data. Although urban WASH coverage is relatively high when compared with rural areas, large intra-urban WASH inequalities persist in many countries, jeopardizing efforts towards achieving universal access to services. (UNICEF 2019)

2.2 Improving Water and Sanitation Availability

Freshwater is a basic natural resource, which sustains life and provides for various social and economic needs. In its natural state, water is an integral part of the environment whose quantity and quality determine how it can be used. Safe drinking water and good sanitation practices are basic considerations for human health. The use of contaminated sources poses health risks to the population as evidenced by the incidences of water-borne diseases such as diarrhea and cholera. Despite its importance to our lives and development, water is unevenly distributed in time, space, quantity, and with great variations in quality. Furthermore, water is a finite and vulnerable resource.

The human right to water specifies that water should be "available continuously and in a sufficient quantity to meet the requirements of drinking and personal hygiene, as well as of further personal and domestic uses, such as cooking and food preparation, dish and laundry washing and cleaning… Supply needs to be continuous enough to allow for the collection of sufficient amounts to satisfy all needs, without compromising the quality of the water." While drinking water should be available in sufficient quantities at all times, it is unlikely that in the short term all countries can attain that level of service. Where services are unreliable or intermittent, households typically store water to ensure that it is available when needed. They may also restrict their consumption when water sources are far away, available only for a few hours a day or at certain times of the year, or out of service. (CSA 2017)

2.3 Barriers to Access Improved Water and Sanitation

Accessibility is a criterion for both “basic” and “safely managed” drinking water services. Because the JMP uses travel time as an indicator of accessibility, it is collected routinely in national household surveys and censuses. Typically, survey teams ask respondents to estimate the amount of time required to travel to the water source, queue if necessary, fill containers and return. While self-reported journey times are not always precise, they do provide a useful indicator of the relative time burden of water collection. To meet the safely managed drinking water services indicator, the water should be collected from a point on-premises—that is, within the dwelling, yard, or plot. Water collected from neighbors or from nearby communal water points is not considered on-premises.

Achieving access to safe water and sanitation still pose major challenges in urban areas of sub-Saharan Africa countries, despite all the progress achieved in the last decade. The concepts of water, sanitation, and hygiene (WASH) initiatives are based on good hygiene practice, access to improved water supply and improved sanitation, which are essential to reduce environmental health risks for the population’s well-being at the global level. Worldwide, 61.1 million disability-adjusted life-years (DALYs) are attributed to the use of unimproved water (95% UI 49.4 million to 69.6 million; 85.4% of diarrheal DALYs) and 40.0 million DALYs (36.0 million to 44.4 million) to a lack of basic sanitation services. Children in resource-poor areas under five years of age contribute the most towards those disability numbers. Minimizing these risk factors could prevent about 5.5% of deaths in this age group.

The lack of access to water and sanitation mostly affects people living in extreme poverty who are vulnerable and marginalized. These are particularly slum dwellers living in precarious settlements in deprived urban areas and those in rural areas or disadvantaged urban fringes. In 2014, the percentage of the urban population in Sub-Saharan Africa (SSA) who were living in slums was estimated at 55%. The target 7c of the Millennium Development Goals (MDG) to halve the percentage of the people without sustainable access to safe drinking water and basic sanitation services by 2015 was not achieved in any West African country. In 2015, about 70% of the sub-Saharan African population was still using unimproved sanitation and 32% were relying on unimproved drinking water sources. Now, the progress related to WASH is guided by the Sustainable Development Goal (SDG) targets 6.1 and 6.2 which aim to achieve, universal and equitable access to safely managed drinking water, sanitation and hygiene, and end open defecation by 2030. (Angoua E, et al 2018)

2.4 The Impact of Water Quality in Urban Community

To be considered safe, drinking water must be free at all times from pathogens and elevated levels of harmful substances. Because drinking water quality is an important measure of safety, most countries have national standards, often based on the WHO Guidelines for Drinking Water Quality. In most countries, contamination of drinking water with fecal matter is the worst water quality problem.

Fecal contamination is usually identified by detection in a 100 ml water sample of an indicator bacteria such as E. coli. However, contamination can vary considerably over time; brief contamination events that can escape detection with routine surveillance still lead to

severe public health outcomes. Furthermore, the preferred measure of fecal contamination, E. coli, is more easily inactivated in treatment than some other pathogens, such as Cryptosporidium parvum. While the presence of E. coli indicates that drinking water is contaminated by fecal is unsafe, its absence does not signify safety. The JMP recognizes that the best way to ensure water safety is through a holistic risk management approach, such as a water safety plan. However, very few countries currently have data on the proportion of people using systems covered by a verified plan. Data on the proportion of people using water supplies that are chlorinated or the extent to which residual chlorine persists at the household level are, however, available for some countries and can be useful service indicators for national monitoring. However, for purposes of global monitoring, for the JMP the principal indicator of water safety is the absence of fecal indicator bacteria in a 100 mL sample. (CSA 2017)

2.5 Sanitation and Hygiene Practices in The Cities

In 2015 Ethiopia met its MDG for water supply. This significant achievement was largely driven by the very rapid increase in safe water access in rural areas where an estimated 57 million people got access to piped and protected water sources between 1994 and 2015. In urban areas, an additional 10 million people benefited from gaining access to piped water on their premises. The World Bank study estimated that, currently, there are roughly about 40 million people without adequate and safe water supply; about 72 million people without adequate safe and improved sanitation systems and 93 million people who are not practicing safe hygiene. Such stark evidence drives the need to design a more pragmatic,

simple, and practical strategy for a rapid change and development of WASH under the OWNP Phase II and beyond.[1]

The promotion of sanitation and hygiene in Ethiopia follows a Government-endorsed Community-Led Total Sanitation and Hygiene (CLTSH) implementation guideline. However, the normal practice in rural communities is that HEW performs regular home visits which can be cited as a household-centered approach to mobilize communities for sanitation and hygiene behavior change. Essentially, a sanitation marketing initiative demands the availability of interested private sector actions who would take sanitation as a business and consumers. Private sector actors, in turn, will need an organized community that is striving to improve the sanitation condition and achieve sustainable change.

A community-centered approach that has prominent, influential and trustworthy individuals as members will identify, motivate and register households that want to upgrade their sanitation and hygiene system and link them with the private sector actors. Sanitation marketing is applicable in communities that have reached to an appreciable state of sanitation improvement because in a community there are open defecators, un-improved latrine users, shared latrine users, and improved latrine users. Those households which are attempting to have a cleanable, permanent type of latrine with shelter and door for privacy are the ones who could be targeted for sanitation marketing. Community-centered approaches would support this improvement so that the private sector could survive.2

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[1] ONEWASH "*Current Status of WASH in Ethiopia" (Page 66)*

[2]*ONEWASH "Improved and Sustainable Sanitation Development during Phase II" (Page 40)*

2.6 Water and Sanitation Policies

Water is the essence of life. Safe drinking water and sanitation are indispensable to sustain life and health, and fundamental to the dignity of all. While water has not been explicitly recognized as a self-standing human right in international treaties, international human rights law entails specific obligations related to access to safe drinking water. These obligations require States to ensure everyone's access to a sufficient amount of safe drinking water for personal and domestic uses, defined as water for drinking, personal sanitation, washing of clothes, food preparation, and personal and household hygiene. These obligations also require States to progressively ensure access to adequate sanitation, as a fundamental element for human dignity and privacy, but also to protect the quality of drinking-water supplies and resources.

The concept of basic water requirements to meet fundamental human needs was first established at the 1977 United Nations Water Conference in Mar del Plata, Argentina. Its Action Plan asserted that all peoples, whatever their stage of development and their social and economic conditions, had the right to have access to drinking water in quantities and of a quality equal to their basic needs. Agenda 21, adopted at the United Nations Conference on Environment and Development in 1992, confirmed this. Subsequently, a number of other plans of action have referred to safe drinking water and sanitation as a human right.

The water supply for each person must be sufficient and continuous to cover personal and domestic uses, which comprise water for drinking, washing clothes, food preparation and personal and household hygiene. Other domestic water uses, such as water for swimming

pools or gardening, do not fall within the scope of the right to water. The right to water, therefore, covers access to water to sustain life and health and to meet basic needs and does not entitle individuals to an unlimited amount of water. According to WHO, between 50 and 100 liters of water per person per day are needed to ensure that most basic needs are met, and few health concerns arise. Access to 20-25 liters per person per day represents a minimum, but this amount raises health concerns because it is insufficient to meet basic hygiene and consumption requirements.9 These amounts are indicative as they might depend on a particular context and might differ for some groups depending on their health status, work, climate conditions or other factors.

Sanitation and hygiene are critical to health, survival, and development. Many countries are challenged in providing adequate sanitation for their entire populations, leaving people at risk for water, sanitation, and hygiene (WASH)-related diseases. Throughout the world, an estimated 2.4 billion people lack basic sanitation (more than 32% of the world's population). Basic sanitation is described as having access to facilities for the safe disposal of human waste (feces and urine), as well as having the ability to maintain hygienic conditions, through services such as garbage collection, industrial/hazardous waste management, and wastewater treatment and disposal. The world did not achieve the United Nations' Millennium Development Goal (MDG) sanitation target (i.e., to halve the proportion of people without sustainable access to basic sanitation by 2015). Now, the United Nations' Sustainable Development goal (SDG) is for everyone to have "adequate and equitable" sanitation by 2030.

The principles of participation and inclusion are extremely relevant for ensuring that all stakeholders participate in policy formulation. Participatory policy formulation can be achieved by providing information. To respond to local water and sanitation needs, States are required to focus on extending access to populations and areas that remain underserved or unserved through, for instance, legislation, policies and strategies. According to the Sub-Commission's guidelines for the realization of the right to drinking water and sanitation, "States should at all levels of government… give priority in water and sanitation policies and programs to the persons without any basic access". (UNHR 2010)

2.7 Water Institutional Arrangements in Ethiopia

Policy, Regulation, Resource Management and Development (Higher Level): Federal Level: The Ministry of Water, Irrigation and Energy (MWIE) sets policies, strategies, regulations, standards and coordinates the management and development of water resources. The Ministry coordinates and supports regional water bureaus and relevant agencies. And responsible for governance and management of cross-regional rivers, lakes, wetlands other water bodies. River Basin Level: River Basins High Council and multiple Basin Authorities deal with the delivery of management and regulatory activities related to trans-boundary rivers, trans-boundary lakes, trans-boundary wetlands, cross-boundary dams, cross-boundary wetlands (Inter-state level). All regulations of the establishment of basin authorities have objectives to promote and monitor the implementation of the Integrated Water Resource Management (IWRM) process in an equitable and participatory manner. Regional Level: Regional Water Bureau works on program planning, management, coordination, and capacity building at regional scale. Approve Woreda

programs and targets technical assistance as needed to Woreda Water Desks and Town Water Boards.

Hydropower Energy Generation (Multi-Level Resource Management): Ethiopian Electric Power Corporation (EEPCO) deals with hydroelectric power planning, development, transmission, marketing and management. Utilities, Contractors and Consultants (Lower Level Delivery Management): At Woreda Level: The Woreda Water Desks are responsible for planning, managing, monitoring & evaluation of local service providers set-up at Woreda & community level. In addition, they coordinate NGOs and other stakeholders working in the area. Water Utilities: Urban utilities such as Water Supply and Sanitation Authority (WSSA) is responsible for planning & administration of town WSS services; operations are contracted out using performance or service contracts. Rural Water utility lead by community/traditional water boards are responsible WSS service at the community level (Water Boards). Communities, villages, organizations may share springs, streams, deep wells, lakes, harvested water bodies, wetlands, etc. Catchment Level: Local governments in Ethiopia organize themselves at catchment and sub-catchment levels for planning, operating and developing the shared water resources and protect the natural system of the environment. (G.Gebremariam 2019)

At the federal level the Ministry of Health, through its Hygiene and Environmental Health Department (HEHD), has the primary responsibility for sanitation and hygiene promotion in the country. The instruments governing sanitation in the country are the Health policy, the Environmental Health policy the National Water Resources Management policy, and the recently developed Sanitation Strategy.

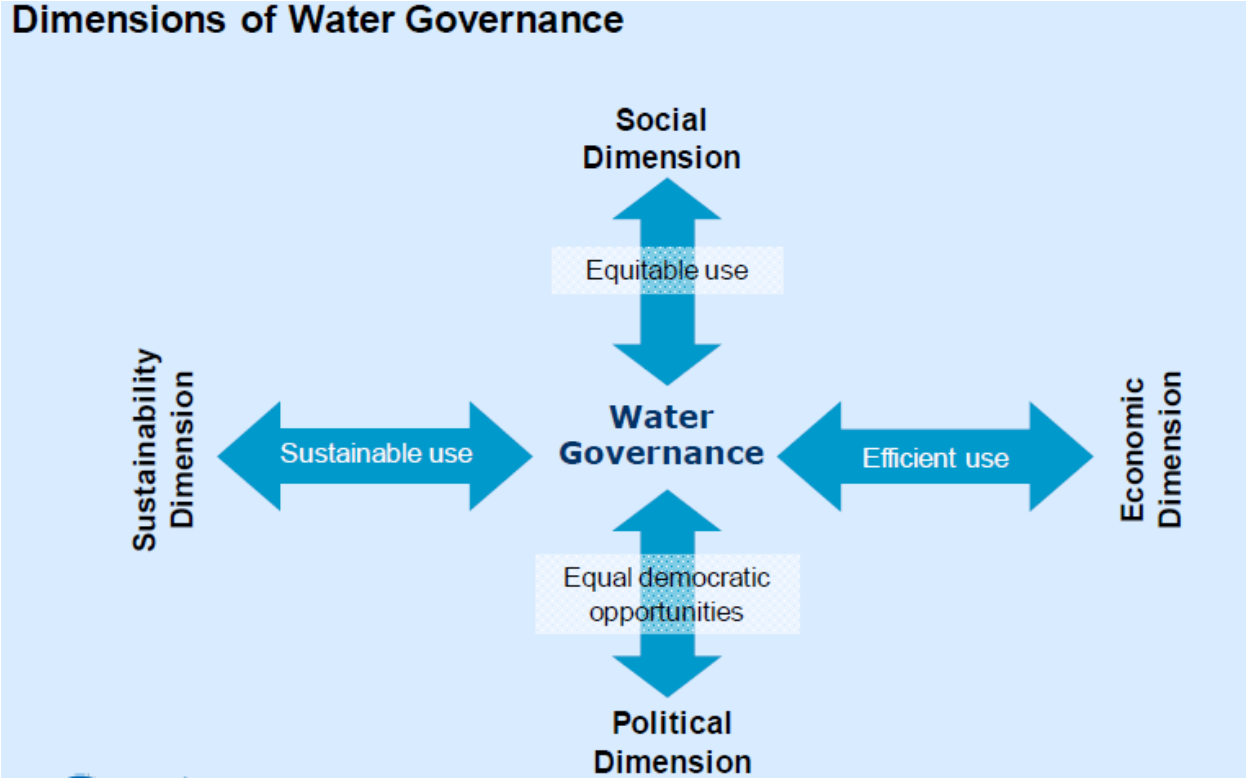

Figure 2 3 Water Governance in Practice, (Source: Alice J, Presentation August 2009)

2.8 WASH and Conceptual Framework

The concept of a WASH 'system', and the recognition of the need to strengthen it to ensure sustainable services at scale, has gathered momentum in the sector in recent years (WaterAid 2019). Huston & Moriarty (2018) define a WASH system as 'all the social, technical, institutional, environmental and financial factors, actors, motivations and interactions that influence WASH service delivery in a given context'. Systems thinkers often refer to institutional 'levels' and categories of 'actors' within a system, including the national (sector) level authorities - responsible for aspects such as legislation, policy and regulation; 'Service Authority' those legally responsible for WASH services in a defined area (which is often, but not always, local government); and 'Service Providers' - those

responsible for the day-to-day operation and management of WASH services. (Lockwood et al. 2017)

WASH is a combination of three distinct sub-sectors (water, sanitation, and hygiene). Whilst there is much similarity between them, there are also important differences, meaning that concepts or approaches for water supply may, or may not, be applicable for sanitation and hygiene, and vice versa. Below some of these key differences are identified and expanded upon as having an influence on how to conceptualize a WASH 'system' & the design of approaches to strengthen it.

Water supply is a public good, sanitation is often seen as a private good. Whilst water supply is widely regarded a public service and generally delivered through infrastructure serving multiple households and in cases across several communities or small towns, outside of contexts where sewerage networks prevail, sanitation is often perceived a private good, particularly where the government or sector focus is on household toilets rather than the wider sanitation service chain. This means that service delivery models (particularly in rural areas) often take a communal approach for water but a household approach for sanitation (Huston & Moriarty, 2018). Hygiene products and services are generally considered private goods. This distinction has implications for the roles and responsibilities of service authorities. In public water supply, the responsibility to ensure the service rests with the service authority. It often has roles including capital investment and ongoing support and monitoring, with daily operation and maintenance (O&M) done by a mandated service provider.

For domestic toilets and hygiene, the responsibility for construction and financing sits with the household (or landlord), who is also generally responsible for the daily 'O&M' of the toilet 'service'. In this, the role of the service authority in sanitation and hygiene is more around ensuring an enabling environment for households and market-based service providers (e.g. masons, toilet emptier); this contrasts with the more direct role of a service authority in ensuring the provision of water supply services. The distinction makes the definition of a 'service provider' less clear. A service provider is responsible for the daily O&M and management of a WASH service. Whilst the term service provider is applicable for the management of sludge treatment plants, and construction and emptying of toilets, it is less applicable for the daily 'O&M' of toilets, which is essentially done by households10. Households are generally defined as 'users' rather than 'service providers' in WASH systems concepts, meaning such definitions of the term "service provider" require further consideration.

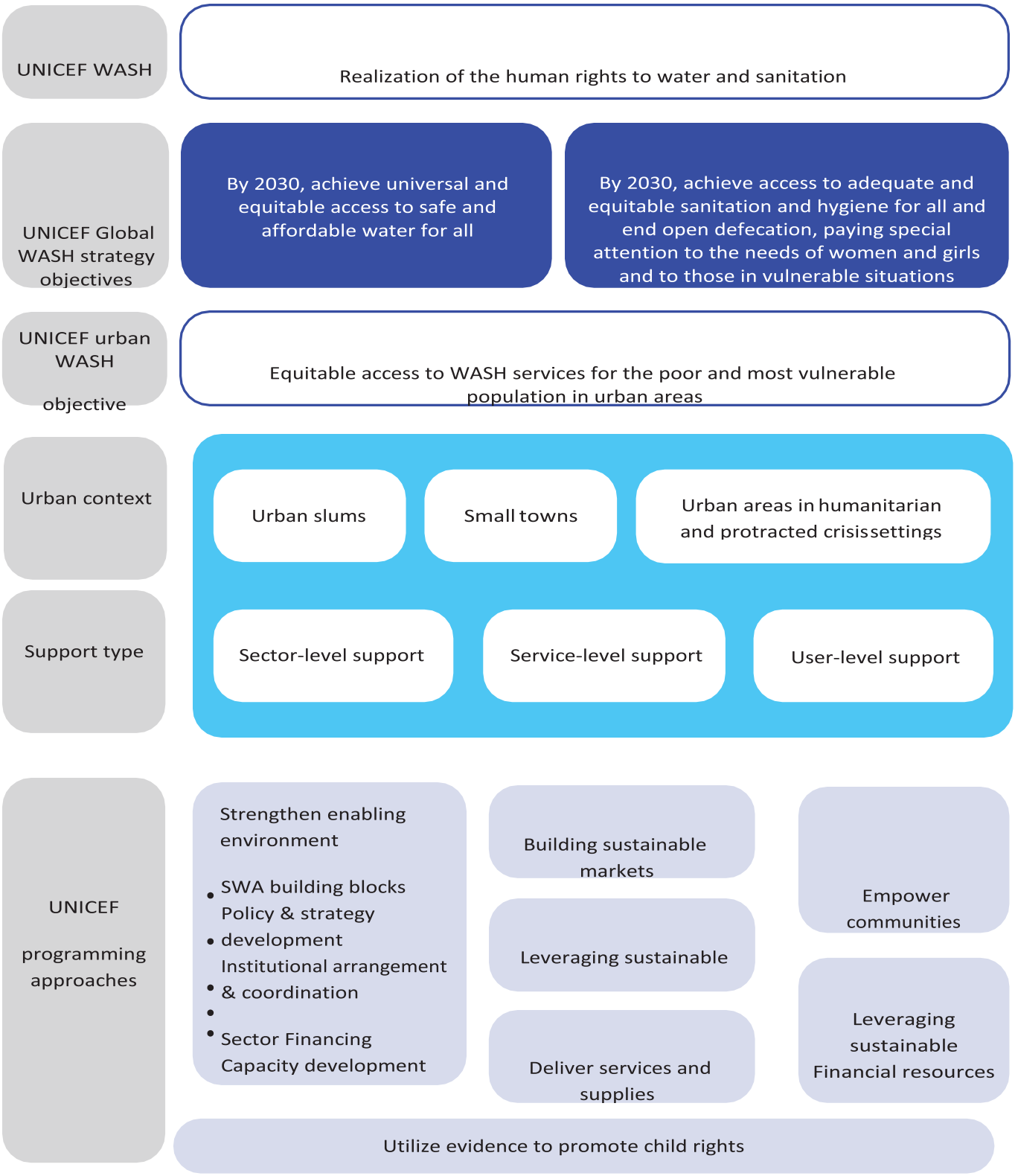

Figure 2. 4 The Global Urban WASH Framework, Source: (UNICEF 2019)

For water supply, a common focus of systems strengthening is on government processes and on strengthening capacities of public water supply service providers. Water is life, while sanitation and hygiene have greater links with culture and individual behaviors where people always have a choice. Drinking water is a basic requirement for life and broadly speaking there is demand from users for water supply services. By contrast, the benefits of sanitation and hygiene are not always directly apparent to users and may be viewed as more 'optional' and hinged on user behaviors. Whilst issues of demand creation, social norms and enforcement are important for water supply, they are critical for sanitation and hygiene, and need ongoing reinforcement.

Sanitation often lacks political capital compared to a water supply. Sanitation and hygiene often fail to receive adequate political interest and commitment, in comparison to a water supply. This is in part reflective of demand and priorities of would-be voters, of cultural factors making discussion of sanitation undesirable, and of the less clear role of the service authority to provide sanitation and hygiene services. In this regard, strengthening stakeholder awareness and commitment to WASH, is critical for sanitation and hygiene. Whilst water supply often rests with one ministry and local entity, sanitation can be split across numerous ministries and entities, sometimes with overlapping or poorly defined mandates. Efforts to strengthen WASH systems will need to consider multiple ministries and consider the linkage with other sectors, such as health and the environment. (Robert G. & Tillett W. 2019)

The WASH Implementation Framework (WIF) is a guiding document for all WASH programs across the country and one of the key documents associated with the One WASH National Program (OWNP). The need for a comprehensive implementation framework was justified by practical lessons learned in the past where the lack of integration did not bring good results or achieve targets. In fact, there had been some attempts to bring the sectors on board and work together, but these were usually unsuccessful. For example, some committees had been created, but with informal terms of reference which resulted in them only functioning temporarily. The absence of established mechanisms to bind them legally through clear mandates, roles, responsibilities and accountabilities remained a big obstacle to success. Taking these practical lessons into consideration, the WASH Implementation Framework was formulated and signed among the four WASH ministries on 9 August 2011 in Addis Ababa. (Ebrahim M, et al 2016)

2.9 Ethiopia Second Growth and Transformation Plan (GTP II)

As a vehicle towards the realization of Ethiopia's vision of becoming a lower-middle-income country by 2025, the Second Growth and Transformation Plan (GTPII) is built on Sectoral Policies, Strategies & programs, lessons drawn from the implementation of the first GTP, the post-2015 sustainable development goals (SDGs). It has also taken into account global & regional economic situations with direct or indirect bearings on the Ethiopian economy. The overarching objective of the Second Growth and Transformation Plan (GTP II) is the realization of Ethiopia's vision of becoming a lower-middle-income country by 2025. Thus, GTP II aims to achieve an annual average real GDP growth rate of

11 percent within a stable macroeconomic environment while at the same time pursuing aggressive measures towards rapid industrialization and structural transformation.

Strategic Directions for Potable Water Supply, Sanitation & Irrigation

The major strategic directions of the sectors during the GTP_II period include foster the development of the sectors' infrastructure to the level of middle-income countries; reduce construction costs; create a conducive environment for the private sector to involve in producing import substitution items; provide financial and technical support to establish professionally-oriented water drilling enterprises/share companies in the country; set national water quality standard; increase active participation of the private sector in the development of medium and large scale irrigation development; facilitate and strengthening the National Meteorological Agency to effectively and efficiently provide service.

The major objectives of the sectors are to expand sustainable potable water supply and improved sewerage systems; to improve potable water supply services and expand accessibility; to establish and improve urban sewerage systems; to assess the quantity and quality of the country's water resources and their contribution to the development of the economy; to mitigate flood and runoff impacts; to develop and expand medium & large scale irrigation; to develop and expand efficient, sustainable irrigation farming; to conduct medium and large scale irrigation study and design activities and make them ready for relevant stakeholders and to supply reliable and sustainable meteorological data to the general public and national preparedness.

Implementation Strategies: In the GTPII period, the national water supply coverage, based on the GTP-I achievement is planned to increase to meet demand. National Groundwater resource potential study and integrated basins administration and development will be carried out. Regarding water supply & sanitation, capacity development, as well as coordination efforts, will be undertaken with all executive agencies and relevant stakeholders. Efforts will be made to ensure a dependable and sustainable water supply based on demand, supply, and efficiency mention measures will be taken to take care of the existing water schemes and ensure the economic use of water. WASH committees will be encouraged to maintain and rehabilitate water supply schemes. Awareness training on national water resources' frameworks will be provided to planners & policymakers including administers. Awareness-raising activities will be conducted to secure the active participation of relevant stakeholders in irrigation development. Measures will be taken to facilitate conditions for medium and large-scale irrigation development. (National Planning Commission 2015)

No.	Sector/ Indicator	Unit of Measurement	Baseline Year (2014/15)	Plan Targets (2019/20)
4.5	Water			
	Overall potable water supply coverage as per GTP II standards service	Percent	58	83
	Rural potable water supply coverage as per GTP II standards service	Percent	59	85
	Urban Potable water supply coverage as per GTP II standards service	Percent	51	75

Table 2 1Projection summary of major targets (Macro and Sectoral) of GTP II

The Government of Ethiopia (GoE) set out its goals in the Growth and Transformation Plan (GTP). This identified water and sanitation as priority areas for achieving sustainable growth and poverty reduction. In line with the GTP, the GoE prepared the Universal Access Plan (UAP) with the following targets, which were adopted for the OWNP:

- 98.5% access to water supply (100% for urban populations and 98% for rural areas)
- reduction of the proportion of non-functioning water supply services to 10%
- 100% access to basic sanitation (improved and unimproved)
- 77% of the population to practice handwashing at critical times
- 77% of the population to practice safe water handling and water treatment in the home
- 80% of communities to achieve open defecation free (ODF) status.

The 98.5% target for water supply is derived from the average for all regions. In most regions, the target is 100% but in Somali and Afar the regional water supply targets are 74% and 75% respectively. These lower figures reflect the challenges of providing water services in these pastoralist regions. The effect of these lower targets on the overall figure (only 1.5% less than 100%) is due to the relatively low population density in these two regions. The ultimate target is 100% for the entire country. (ONE WASH 2019)

2.10 Addis Ababa Water Supply and Sanitation Facility

The population of Addis Ababa will reach around 5 Million by 2020. The projection was based on the national population census of Ethiopia, 2007. The population growth rate is considered to be 2.1% per annum. Based on this assumption the domestic per capita demand will reach 110 liters and its proportion in the overall demand will increase from

the present 50% to 74% by 2020. The overall water demand of Addis Ababa is estimated to reach 252 million m3/year by the year 2020. On average 68 % of the total demand is the domestic water demand and 32% is for non-domestic demand. Since the existing sources, including the 73,000m3/day from Akaki, can provide about 373,597m3/day, the additional production requirement is 315,309 m3/day which is about 85% of the existing production. (AAWSA, 2011)

Water demand (supply requirement) is assumed to grow at a constant rate of 3.52% /annum. The increase in consumption is assumed to be balanced by the decrease in leakage resulting in a constant rate of demand growth. For all user groups, total daily per capita water demand grew from 145 liters in 2015 to 176 liters in 2016 with an equivalent 2.13% annual growth rate. During 2026-2030, domestic, industrial and commercial consumers will be 74%, 5% and 20% respectively (GTP II). The sizes of industrial and commercial water customers were assumed to show an average annual growth rate of 2.76%, 0.0196% and 0.0251% during 2011-2015 (AAWSA, 2011), 2016-2020 and 2026-2030 respectively.

Year	Population	Water demand l/c/d	Physical Loss in %	Total Demand l/c/d	Total Demand m^3/day
2005	3,104,908	102	20	122	380,041
2010	3,698,710	122	20	146	541,491
2015	4,394,217	141	19	168	737,306
2020	5,098,917	160	14	182	930,042
2025	5,803,617	191	10	210	1,219,340

Table 2.2 1Current & Projected Water Demand Presentation (Source: AAWSA 2020)

The water supply and sewerage system of the city are governed by the Addis Ababa Water Supply and Sewerage Authority (AAWSA). The utility operates the water supply and sewerage services in the city by dividing the city into eight branch areas (Mekanisa, Nifas Silke, Gurd Shola, Arada, Akaki, Gulele, Addis Ketema, and Megenagna). The city uses water from both surface and groundwater sources. Currently, it is difficult to differentiate which part of the city gets water from which source (the system is mixed). However, it is possible to say that generally, the eastern and northern parts of the city use more surface water resource (from Gefersa dam), the western and middle part of the city receives both surface and groundwater (Legedadi dam and Legedadi groundwater), and the southern part gets water mainly from groundwater (Akaki well field). Due to rapid urbanization, the lifestyle of city dwellers is changing, and many new condominiums are under development. Since these condominiums include modern water and sanitary facilities, they consume more water, increasing demand on the city water supply. In addition, the city is undertaking many expansion and construction projects (e.g., industrial, offices, and international hotels). Due to this, there is a huge migration from the rural part of the country, further increasing the water consumption and creating water supply and sanitation service challenges. (Yonas T et al. 2018)

Each local government in Ethiopia contains a 'Woreda WASH Team' responsible for all aspects of water and sanitation development in the district, including management and oversight of scheme construction, provision of maintenance support, financial management, and M&E. This local mandate is expected to expand in the face of a renewed focus on low-cost technologies and self-supply. Most woreda offices, however, lack

sufficient human resources and operational budgets to effectively perform even their current role.

The development of coordination structures across the water resources, health, and education sectors has been a major institutional theme under the emerging WASH program over recent years. This effort has undoubtedly heightened awareness of the complementary benefits of coordinated interventions across sectors. However, the somewhat bureaucratic nature of cross-sector coordination structures, expected to be established across all tiers of government, has also created bottlenecks and, arguably, reduced focus on the more pressing need to establish effective institutions within each sector. As such, the commitment to WASH should be maintained, but the focus is required on coordinating efforts where they add value to outcomes: primarily at the local implementation level. (AMCOW 2015)

2.11 WASH Conceptual Framework

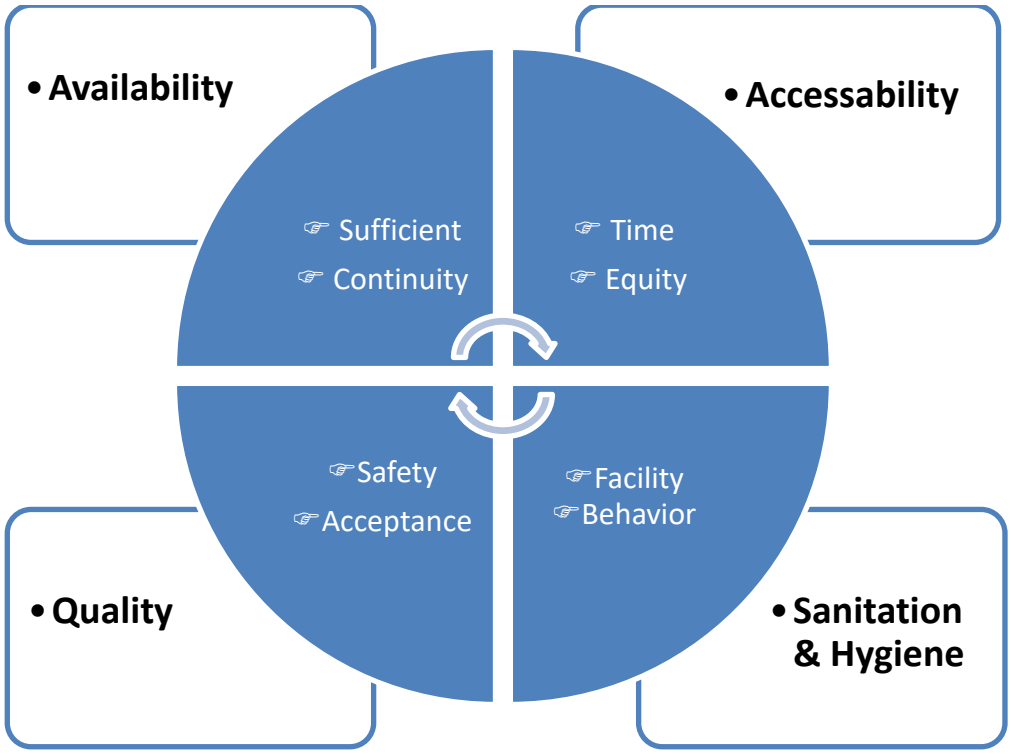

Figure 2.5 Conceptual Framework Based on Literature Review (Source: Author 2020)

CHAPTER THREE

3. METHODOLOGY OF THE RESEARCH

3.1 Description of the Study Area

Addis Ababa, the capital city of Ethiopia and the headquarter of the African Union was founded in 1887. According to the Central Statistical Authority (CSA 2016), close to five million people live in Addis Ababa, which accounts for over 30 percent of the urban population in Ethiopia and it is one of the fastest-growing cities on the continent. Its population has nearly doubled every decade and as a result, Addis Ababa has expanded geographically to cover an area of 540 sq km. Addis Ababa's geographical location combined with its political and socioeconomic status has made it the melting pot for hundreds of thousands of people that come from all the corners of the country in search of employment and services. Such a rapid increase in population together with the rapid development of the city has produced increasing volumes of water and sanitation facility induced greater infrastructural demand, institutional setup, and community participation for its management. The Addis Ababa city government at the top level, 10 sub-cities in the middle level, and 116 woredas at the bottom (CSA, 2010).

Gulele Sub-city is one of the sub-cities in Addis Ababa. The district is located in the northern suburb of the city, near the Mount Entoto and Entoto Natural Park. It borders with the districts of Kolfe Keranio, Addis Ketema, Arada, and Yeka. The total area of 30.18 km^2, population 284,865 (female and male are 147,175 and 137,690 respectively) and the population density is 9,438.9 persons per km^2 (CSA, 2010). Out of the population, the total number of households in the area is 61,920. This sub-city is divided into 10 administers

woreda/kebele. The sample of these studies was therefore taken from three woredas, namely Sheromeda (Woreda 01), Mariyamwonez (Woreda 5), and Meketeya (Woreda 06).

According to the secondary data acquired during woreda administration interview, the total number of household in the stated three woredas are 21,559 House Holds (i.e. woreda 1 = 7,738, Woreda 5 = 7,036 and Woreda 6 = 6,785). This area is attributed to high population density, oldest, crowded to represent others. The features that differentiate this area from another slum in the city is, the peoples are traditionally stigmatized as the lowest caste.

Figure 3.1 Study Area Blue Highlighted (Gulele Sub-City) Source: AA City Gov. Website, 2017

3.2 Research Design

To make this particular research more practical and tangible, the methodology of the study had focused on Water and Sanitation Problem. The methodology explained the approaches that were used to meet the research objectives and questions. To achieve the objectives and to explain the research scenario, a descriptive survey research method was adopted. Besides, both qualitative and quantitative approaches (a mixed approach) was used to assess and understand the different factor that affects water supply and sanitation facilities in the given selected area.

3.3 Sampling Technic and Sample Size

The total number of sample households is determined by the targeted sub-city total HHs. Due to the time and financial constraints, the total number of households was sampled by a 90% confidence level and a 10% error. And, in order to determine the valid sample for the study, the scientific sampling formula explained by (Yamane, 1967) was used. Based on this calculation, out of 21,559 households in the study area, 120 sample households were selected and surveyed. Also, the sample size fulfills the requirements to validate the Contingent Valuation Method (CVM).

Sample Household (μ) = $N/1+e^2N$

μ - sample population, N- Total number of households in the sub-city, and e - error (%)

Woredas	**Woreda 01**	**Woreda 05**	**Woreda 06**	**Total**
Area Name	Sheromeda	Mariyamwonz	Meketeya	3
Total HHs	7,738	7,036	6,785	21,559
Sample HHs	50	35	35	120

Table 3. 1 Updated Data from the three Woreda Administration Office(Source: Author, 2020)

3.4 Study Area Selection

The case study area selection criteria were based on the research questions. Besides, there were three major reasons for selecting the Gulele sub-city for this study. First, compared to most other areas in Addis Ababa, considerable information exists on the major problems of access to potable water and sanitation facility. Second, as one of the most affected areas of the city specifically the slum woredas, the topography of the area and the living standard of the majority residence took root invariably making access to drinking water as one of the major societal problems. And, third, the researcher's prior experience in the area. Based on these criteria, the Gulele sub-city slum area was selected for the case study and it was selected as a study site because it represents well the city slum woredas pictures that are also passing through the same challenges. It is also located in the northern part of Addis Ababa. This sub-city is divided into 10 administrative woreda/ kebele. The sample of these studies was therefore taken from three most disadvantaged woredas (slum areas of the woredas); Sheromeda, Mariyamwonez, and Meketeya another administrative name for the three woredas are (woreda 01), (woreda 05) and (woreda 06) respectively.

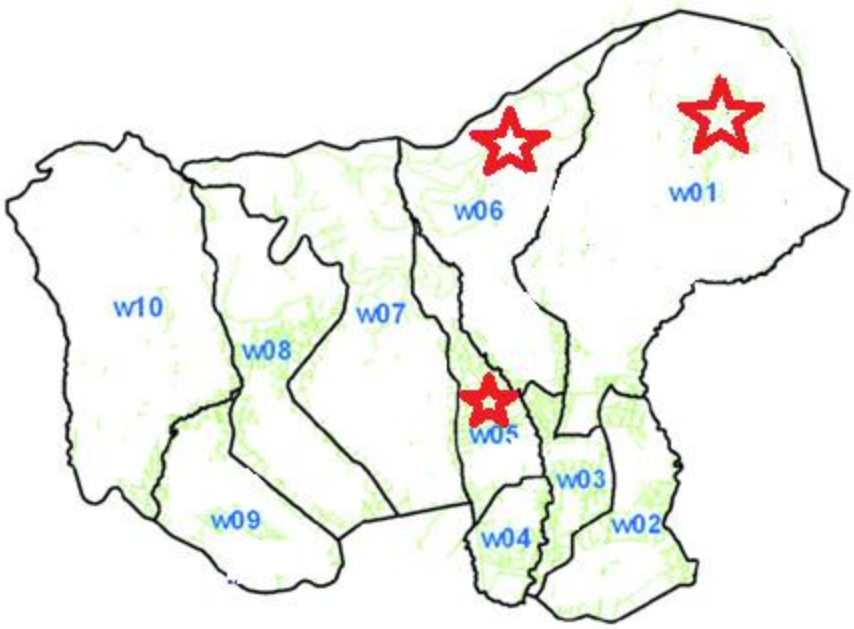

Figure 3. 1 Gulele Sub-city Map, study area indicated by a star (Source: Author 2020)

3.5 Data Collection Methods

In this study, different data collection methods were employed. These are questionnaires, interviews, and observation. Concerning the questionnaires, there were two types of questionnaires (both open and close-ended) that were prepared for both residence and office workers. These questionnaires were first prepared in English and it was translated into Amharic to make it easily understandable for the selected interviewees. After preparation, 10 questionnaires were randomly distributed as a pretest to correct unclear and misleading questions. Besides, interviews (structured and unstructured) and uncontrolled observation were employed. Apart from these, the researcher had used field observation to assess water supply and sanitation facilities in the sampled area.

In this study, both the primary and secondary data sources were used. Primary data was gathered from sample respondents of the selected households, woreda employees, AAWSA staff. On the other hand, Secondary data was extracted from different sources including published and unpublished materials from AAWSA, Mistry of Water and Energy, and the three woreda administrations in the sub-city.

Table 3. 2 Guiding Framework For Data Collection (Source: Author, 2020)

DIMENSION	**INDICATOR**	**WHAT TO MEASURE?**	**Potential Variables**
WATER SUPPLY AND SANITATION	- Availability	- How much water is available to people to carry out their day-to-day activities	- Per capita water use - Number of people using improved water sources
	- Accessibility	- What percentage of the Woreda population has access to clean drinking water?	- Population access to piped water supply - Service area coverage for piped water supply - Average distance traveled to fetch water from improved water sources
	- Quality	- Does the water supply to meet the national/international standards?	- Customer satisfaction with water quality - Type of water treatment employed - Residual chlorine content
	- Hygiene and sanitation	- What is the level and nature of sanitation facilities in the Woreda and what is their impact on human health?	- Number of people using improved sanitation facilities - Water-borne disease factor

Interviews

The interview helped to understand the current status of water supply and sanitation facility conditions in the sub-city specifically in the three woredas. In addition, this was helped to found information about the water policy and strategy that applied in the community. Interviews were conducted with the water utility (AAWSA) experts, and Sub-city administration experts and Woreda Administration. The researcher used unstructured and semi-structured interviews. These methods are helpful to elaborate important information to the participants and to receive required enough information. An unstructured interview is helpful to get detailed information. Therefore, if the data required detailed information applied unstructured interviews, if not, semi-structured interviews were applied for the respondents. During the household survey, interviews of the questionnaire applied for all sampled 120 households as most of them could not read and write the questionnaire lists.

Questionnaires

Semi-structured and structured questionnaires were used for this research. Structured questions are useful to gather information, which does not need any elaboration (Gill et al., 2008). The households provided their answers according to the reality that they are living. The questionnaire of the households addressed; the current water supply, water availability, water quality, sanitation facility, Hygiene, and their satisfaction & preferences. (Refer appendices 1). Besides, the questionnaire helped to cross-check the information gathered from water organizations interview regarding the water policy and supply strategy. A survey questionnaire list was prepared by their language and tested for 10 households before undertaking the whole data collection.

Observations

The physical observation was another way of data collection that was helpful to compare the respondent's responses with the realities. Voice records, videos, and pictures were also gathered during field observations. Besides, the checklist table was prepared to gather and register information about the real water supply and sanitation facilities.

Table 3. 3 Data collections Techniques (Source: Author, 2020)

Research Questions	**Data Collection Method**	**Data Requested**	**Data Sources**
Main Research Question: The current status of urban water supply and sanitation facilities in Addis Ababa?			
1. What are the major challenges in the provision of water and sanitation facilities in the selected woredas?	A semi-structured and structured questionnaire, interviews, observation	The economic status of the HHs, Service Type	Households, AAWSA
2. What are the impact of inadequate water supply and sanitation on the life of the community?	A semi-structured and structured questionnaire, interviews, observation	Availability, accessibility, quality	Households, AAWSA experts, official documents
3. What are the main reasons for the slum communities dissatisfaction?	A semi-structured and structured questionnaire, interviews	Satisfaction, Hygiene Problem, Health Impact,	Households, AAWSA experts, official documents
4. What measures should be taken to ensure sustainable water supply and sanitation services in the selected woredas?	Secondary data, literature reviews	Anticipated needs, preferences	literature reviews

3.6 Data Processing and Analysis

The data generated from the secondary material was used to supplement and validate the data generated by the primary techniques. Primary data collected from the woredas were edited, cleaned, and coded to render data usable for empirical analysis. The missing data and outliers have to be dealt with by using the average method and median. After the data were collected and the responses are coded, the data was entered into a computer. The researcher utilized the research questions and theoretical formulations as an analytical framework to analyze the data. The collected primary and secondary data were analyzed with different techniques. SPSS was used to analyze the household survey. Besides, other applications such as Microsoft Office Word, Microsoft Office Excel was used to write texts, create tables and graphs.

In the analysis process, the frequency distribution of variables and their percentile was worked out to describe the raw data. To ascertain the association between dependent and independent variables, the adjusted odds ratio with a 90% confidence interval was calculated at 10% significance level.

3.7 Statistical Data Analysis

Quantitative data generated from the HHs survey were analyzed using simple descriptive statistical tools like frequency, valid, and cumulative percentages. And processed with SPSS and Microsoft Excel. The findings were then presented in graphs and frequencies. Conversely, qualitative data were analyzed by narrative and thematic analysis and used to enrich the quantitative data and also draw conclusions as guided by the objectives and assumptions of the study.

3.8 Ethical Consideration

The researcher received a letter of introduction from Addis Ababa University to collect primary and secondary data. Participants of the study were informed about the objectives of the study emphasizing that the data will be used only for the intended academic purpose. To ensure confidentiality, the name of the interviewees was not written on the questionnaire. Each respondent was assured that the information provided by them as confidential and will only be used for the research. Participants also informed that they have the full right to discontinue or refuse to participate in the study. The data was collected by employing various techniques with the consent of the participants of the study. Because of the COVID-19 pandemic, keeping social distancing and avoiding shaking hands, the researcher had used safety materials like a face mask, glove, and sanitizer. Above all, careful attention was given regarding respecting the rights, needs, and values of the study subjects, and maintaining the confidentiality of the data, and acknowledging the sources of information.

CHAPTER FOUR

4. RESULT AND DISCUSSION

4.1 Analysis of data

The raw data that was collected from the household was analyzed by using Excel spreadsheets first. And then the data was inserted by SPSS. The result from the SPSS was interpreted and presented by using tables, charts, graphs, and descriptive analysis using both Windows Application. The qualitative data that was collected through personal observation and the interview from water organizations were analyzed by a narrative based on the theory of literature review. Based on these, the conclusion and recommendations were prepared.

4.2 Demographic Characteristics of the Households

For this study, a total of 120 sampled households were interviewed. However, due to incomplete and misused answers, 116 questionnaires were analyzed. A summary of surveyed households' data is given in *Figure 4.1*. Of the surveyed households 43 (37%) were Female respondents, while 73 (63%) were male. From a total of 116 sampled households, 92 (79%) are heads of their households and the rest 24 (21%) are not. The average family size of the household is 5.3 with a minimum of 2 household members to a maximum of 15 household members. The education figures reveal that 5(4%) undergraduate degree, 11 (9%) have a diploma & certificates, 82 (71%) were 4-12 grades, while the remaining 18 (16%) were categorized under illiterate group (0 years of schooling). Regarding the employment structure of the respondents, 31 were employed in government organization and 4 were employed in private sectors which represent (27%)

and (3%) of the total respondents respectively, while 62 (53%) were self-employed, and the remaining 19 were retired and or unemployed which represents (16%).

Demography	Values	Frequency	%	Valid Percent	Cumulative Percent
Respondent Gender	Female	43	37.1	37.1	37.1
	Male	73	62.9	62.9	100
Respondent Level of Education	Degree	6	5.2	5.2	5.2
	Diploma	11	9.5	9.5	14.7
	Grade 4 - 12	81	69.8	69.8	84.5
	Uneducated	18	15.5	15.5	100
Respondent Income Source	Government Employee	31	26.7	26.7	26.7
	Self-Employee	63	54.3	54.3	81
	Pension	22	19	19	100
	Total	116	100	100	

Table 4 1Demographyic Characteristics of Respondent

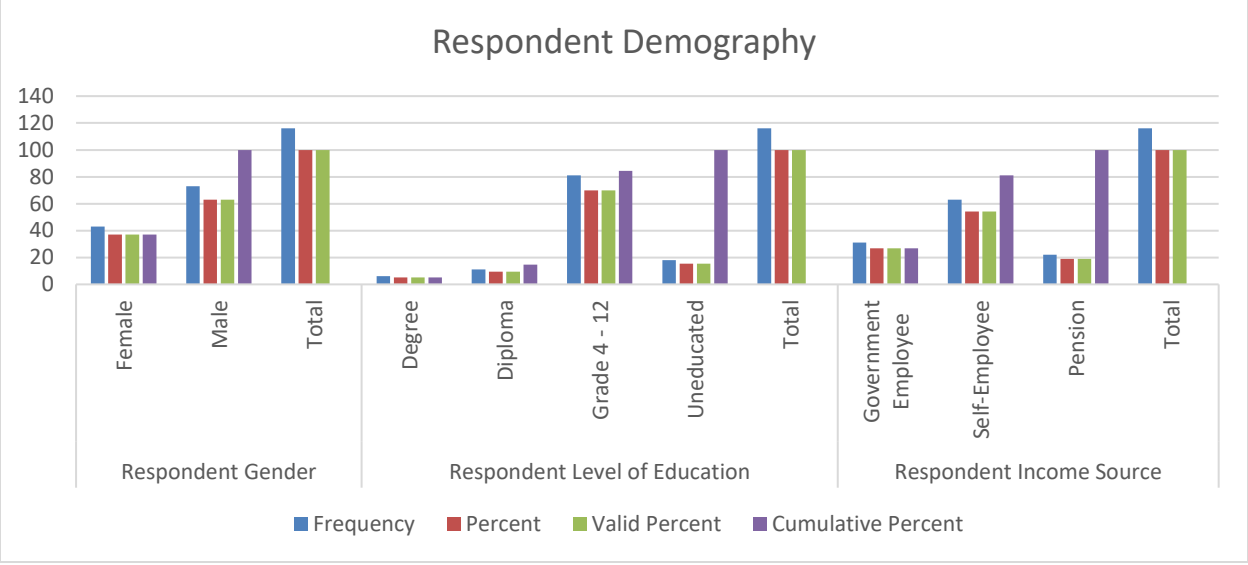

Figure 4. 1 Summary of Respondents Demography (Source, Author 2020)

The three woredas are known by its congestion and the communities are densely populated. In this area, most of the residents are migrated from the southern part of the country mainly occupy the three woredas. About 53% of the households are involved in unskilled labor and small business like weaving of traditional clothes, pottery making, and collecting fuelwood collection from the nearby forest. As indicated above only thirty percent of them were hired to the government and private organization and depend on a monthly salary, the rest of them do not have a sustainable source of income to support their household. Besides, the majority (87%) of the respondents are non-highschool graduates and illiterates, this reveals that most of the residents are not educated and running a poor life both in terms of knowledge and basic facilities like water and sanitation.

4.3 The Current Water Supply

Water supply coverage of the city both in quantity and level of connection is low while compared to other cities as well as the basic need. In this section, the main source of water, time taken to get water, and its quantities are discussed. As per the information collected from AAWSA experts, several places get a low volume of water due to their topographic location. As the city mainly uses a gravitational supply system on top of the regular water pumps, topography has a great impact on the per capita consumption of the community.

From the household interview, it was able to identify that 69% of the community have piped water, 33% use a delivered water source, and the rest 14% use other sources. The time taken to collect water from the source is vary depending on the closeness to the main water source, accordingly, 22 households, which is 19% collect water from 30 minutes to 1-hour distance, the other get water in between 10 to 30 minutes walking distance. For the

question “Is your household did not have sufficient quantities of drinking water when needed in the last month?” 5 households said “no, always sufficient” which is only 4% are getting sufficient water, otherwise, 96% are didn’t get adequate water in the last month.

The other water concern is who fetch water for the household. Out of the total 116 households, 90 responded it was a responsibility of the adult women, which hint at the women are more burdened on water collection than the male. As per the SDG plan achieving gender equality and empowering women & girls are the municipality and the woredas basic assignment. As it is explicitly stated on the plan, gender equality is not only a fundamental human right but a necessary foundation for a peaceful, prosperous, and sustainable world. Recognize and value unpaid care and domestic work through the provision of public services, infrastructure, and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.

The availability of water supply was another issue this paper dealt with. In the survey, it was noted that 93% of the households get water once a week. In addition to this, the time of water availability is unpredictable, and once it came it stays for less than 6 hours. About the reasons for water interruption, the respondents mentioned, insufficient production of water, and lack of government attention is the main issue raised as a cause. Besides, the landscape (the topography), power interruption, road construction, and pump failure are additional reasons mentioned by the households as causes of the water interruptions. In this regard, the average time spent to get water from the sources was about 30 minutes. It is not far from WHO standard’s access to water in a round trip should be within 1 km and 30

minutes (WHO, 2017), however, because of the water interruption without prior notice to the community, specifically, women's spend their golden time without getting water.

As per the UN Minimum Standards in Water Supply, Sanitation, and Hygiene Promotion standard, people should have adequate facilities and supplies to collect, store and use sufficient quantities of water for drinking, cooking and personal hygiene, and to ensure that drinking water remains safe until it is consumed. Each household has at least two clean water collecting containers of 10-20 liters, plus enough clean water storage containers to ensure there is always water in the household. The survey result showed that the majority of 96% of the respondent has 10 to 20 liters capacity jerrycan to collect water. Because of the water quality problem in the area, 50% of the respondent mentioned that they use a water filter in order to purify their water. Others said they boil water, and few said they add chlorine on it. For the question about the acceptability of the water and its color, the majority 65% responded that the water has unacceptable color, the rest said unacceptable color and it has a smell.

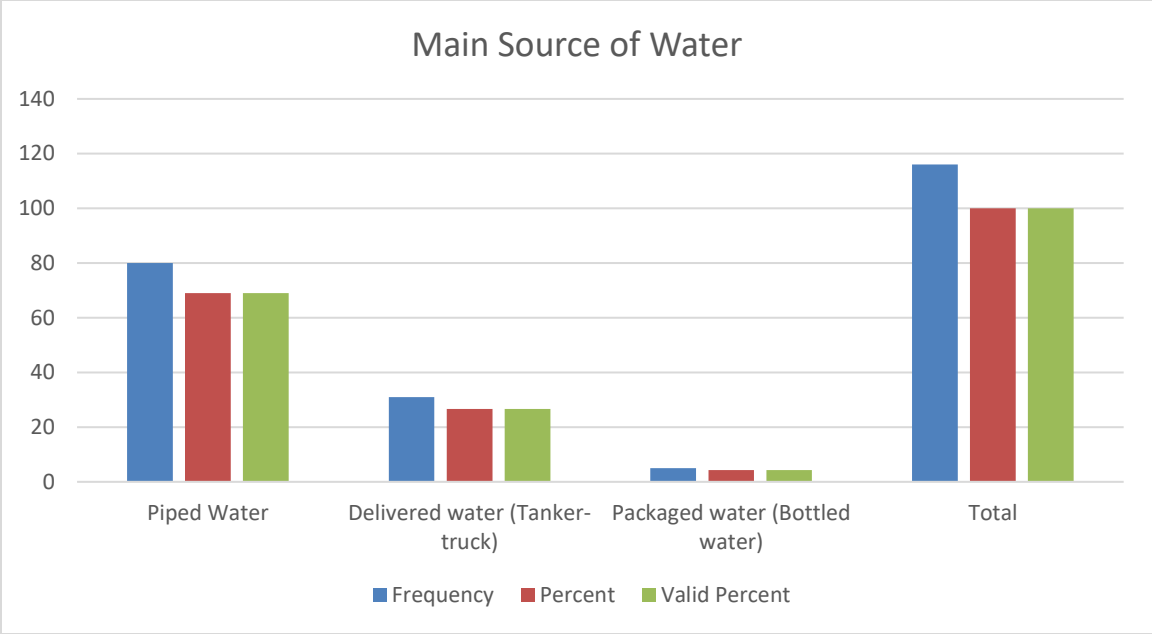

Figure 4. 2 Main Source of the HH Water (Source, Author 2020)

In an exclusive interview with woreda 6 health extension expert, the Woreda Administration is working hard to satisfy the water supply need of the community. In this regard, water is distributing/rationing using leased vehicles twice in a week dedicating a fund, but the coverage is still minimal. The densely populated lifestyle and the need of the community are overwhelming to satisfy with this pace unless the city utility administration takes a reliable action.

The above results imply that this community is way behind any water standards that the world has agreed on and achieving the Sustainable Development Goal is a more likely endeavor. Besides, the researcher triangulated the current year demand and the future water demand in the area. Henceforth, under a 2% population growth rate the projected annual water use rate increased with notable changes from the year 2020 - 2025. The current water supply for Addis Ababa was 575,000 Cubic meters per day; the total population estimated

for this year was 5,098,917. The catchment area population is 118,574 and the current water supply for the area was 13,371.48 m^3/day calculated using the population trend assuming evenly distributed which becomes 112 l/d/person. According to the AAWSA estimated water demand for the current year (2020) 160 l/d/person, the current water supply should have been 18971.84 m^3/day for the study area. The actual water needed for the area was 21, 628 cubic meters which is 14% above the threshold.

Moreover, the GTP II target plan for Urban Potable water supply coverage was 75%, but the findings showed that the current status of the targeted area was way behind the forecasted target. In a nutshell, this is implying that demand and supply are not matched as expected. It infers that if the water service is regular, the majority can have satisfied by accessing water without taking much of their time. If this trend continues the residents will suffer from the shortage of water.

Water Supply	Values	Frequency	%	Valid Percent	Cumulative Percent
Current Water Supply	Piped Water	80	69	69	69
	Delivered water (Tanker-truck)	31	26.7	26.7	95.7
	Bottled water	5	4.3	4.3	100
Time to get water	above 30 minutes	22	19	19	19
	below 30 minutes	94	81	81	100
Monthly Sufficient Quantity of Water	Yes, at least once	111	95.7	95.7	95.7
	No, always sufficient	5	4.3	4.3	100
Responsible to fetch water for the HH	Adult woman (>15 years)	90	77.6	77.6	77.6
	Adult man (>15 years)	26	22.4	22.4	100
How Often the HH get water	Once in a week	108	93.1	93.1	93.1
	Once in two weeks	8	6.9	6.9	100
	Total	**116**	**100**	**100**	

Table 4 2 Water Supply (Source: Survey Data 2020)

4.4 The Sanitation Facility

Due to the magnitude of unimproved sanitation and its environmental, health, and economic impacts, universal clean sanitation has been promoted as one of the pillars of the United Nations' Sustainable Development Goals (SDGs) for 2030. Reaching this ambitious objective, however, will require tackling a range of obstacles, including selecting the most appropriate sanitation option in each local context and the hand-in-hand efforts from the municipality and the community.

The respondents were asked the kind of toilet facility they have, accordingly, 110 households which were 95% of them answers they use a dry pit latrine, and the rest 5% use flush/pour flush toilet. They do not require water so are appropriate in areas where there is no adequate water supply. However, pit latrines are not without limitations. There may be a foul odor from the pit and they can be a favorable place for the breeding of flies and mosquitoes. According to the researcher observation, some latrines are built by Non-Governmental organizations like Good Neighbors Ethiopia in order to serve two to three households. Apart from the latrines closeness to their homes, the number of people using one latrine is in the domain of the standard 1 latrine for 20 people. But, there is no guarantee for their cleanness, and they are not gender-segregated. Apart from this, 26 respondents (22%) said their sanitation facility leak or overflow wastes at any time of the year. In this area, the other findings this paper pointed out were the septic tank discharge and emptied, majority discharge to an open drain and they don't know the exact day when the septic tank

was emptied. For the question raised about the place where their septic tank discharge to does, the majority responded to an open drain. Besides, for half of the respondents, the service year of the toilets is 10 to 20 years, and it was observed that the majority of the household toilets are very old, stinky, and below the standard.

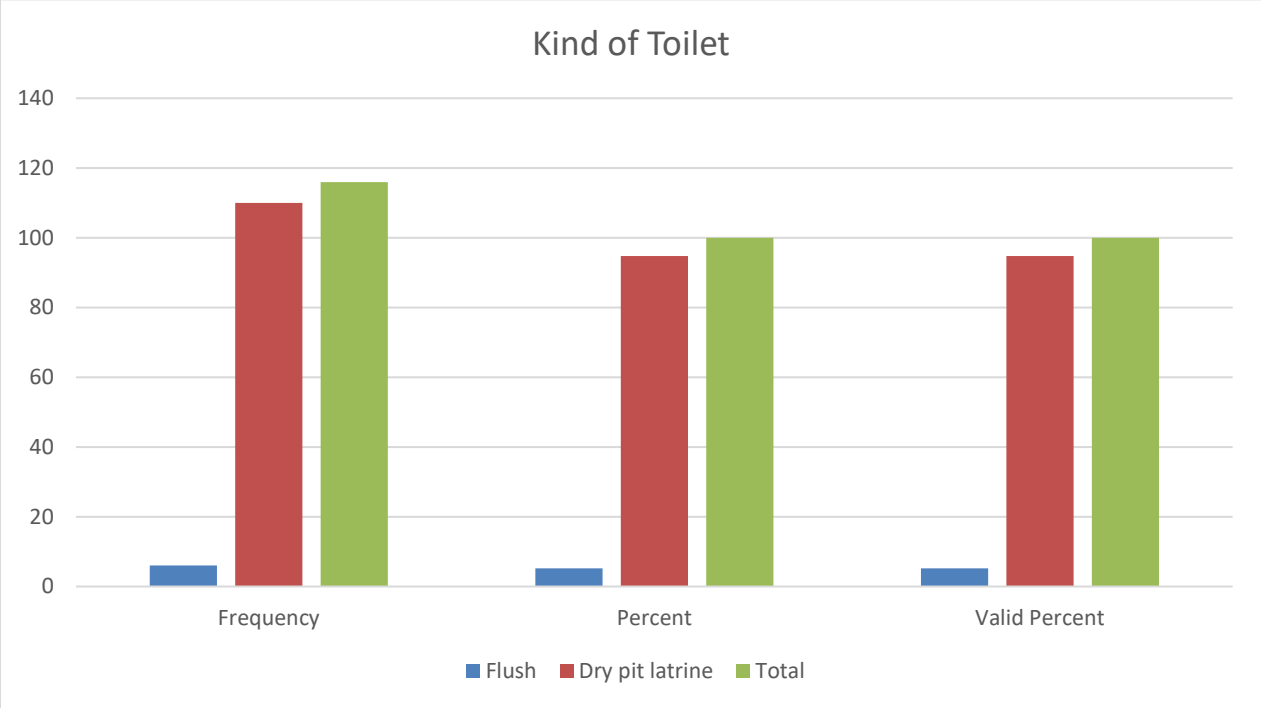

Figure 4. 3 kinds of toilet facility the HH's use (Source, Author 2020)

In the three woredas, there are public toilets in an open place. The researcher observed that almost all the Woreda 1 and Woreda 6 Public toilets are not giving service, and some are locked by the woreda health experts to avoid further health-related infections and diseases. According to the interview made with woreda 1 health experts superior, the existing 9 public toilets are not functioning well, except few. Formerly there was some private sanitation material support from the government side, like sand and cement for private pit latrine, but the community awareness is very poor, and after sometimes they closed the

hole and build a house and rent it to make money and they keep defecating in an open place. In the same token, during the interview conducted with Woreda 6 whenever we go for sanitation and handwashing teaching, the community complained about the availability of the water. So, we refrained from going to the community and our major role is compromised because of water shortage in the area.

The UN explained: "Clean water is a basic human need and one that should be easily accessible to all. The SDG sanitation indicator explicitly stated that a safely managed sanitation facility is one where excreta is safely disposed of in situ or treated off-site. A basic handwashing facility is defined by a device to contain, transport, or regulate the flow of water to facilitate handwashing with soap and water in the household.

However, this research findings showed that the sanitation facility of the community is very poor and it lacks basic requirements. The researcher observed that most of the latrines are adjacent to their kitchens and water sources. The latrines are very old and have no doors and cover on the hole. The people's awareness and the health extension worker's efforts are very minimal to change this life-threatening situation. Also, almost all don't have a handwashing facility. Furthermore, the public toilets that are constructed in these woredas are not giving the intended service, some are closed by lockers, some are out of use.

Besides, in the COVID-19 response, during data collection time the researcher observed quite several water tanks with sanitation materials in an open place at the three woredas. In addition, posters and practical handwashing demonstrations were given to the community specifically at the front of the health centers of the woreda. This has a positive behavioral

impact after the pandemic, and it will leave the best legacy that one can change through the normal handwashing awareness training and knowledge sharing forums.

Sanitation	Values	Frequency	%	Valid Percent	Cumulative Percent
Kind of Toilet	Flush	6	5.2	5.2	5.2
	Dry pit latrine	110	94.8	94.8	100
Share with other	Yes	92	79.3	79.3	79.3
	No	24	20.7	20.7	100
	Total	116	100	100	
Toilet Facility Location	In own dwelling	74	63.8	63.8	63.8
	Elsewhere	42	36.2	36.2	100
Emptied Before	Yes emptied	104	89.7	89.7	89.7
	Never emptied	12	10.3	10.3	100
Last time it was Emptied	Removed by a service provider	108	93.1	93.1	93.1
	Emptied by household	8	6.9	6.9	100
	Total	116	100	100	

Table 4 3 Sanitation Facility (Source: Survey Data 2020)

4.5 Household Satisfaction and Preference for WASH Facilities

The information collected from the respondent about their level of satisfaction on the water and sanitation facility, 86 respondents said they are not satisfied at all with the water service which is 74% and the remaining 26% said they are satisfied with the service. For the sanitation service, 98 respondents said unsatisfied, which is 84% of the total respondents. The quality, the reliability of the water source was some of the issues that dissatisfy the community. There is no fixed time table that the water comes to the community, so all the community are suspicious of its coming and sometimes they don't get proper sleep while waiting for water. For the questions related to handling a responsibility were also presented

to respondents (Refer Appendices 1. Section D), 74% of them choose the drinking water service management should be under government control hence the government must set standards, 20% of them preferred government and private companies. The remaining 6% of respondents preferred to administer by government and NGOs, NGOs, community, and private companies consecutively.

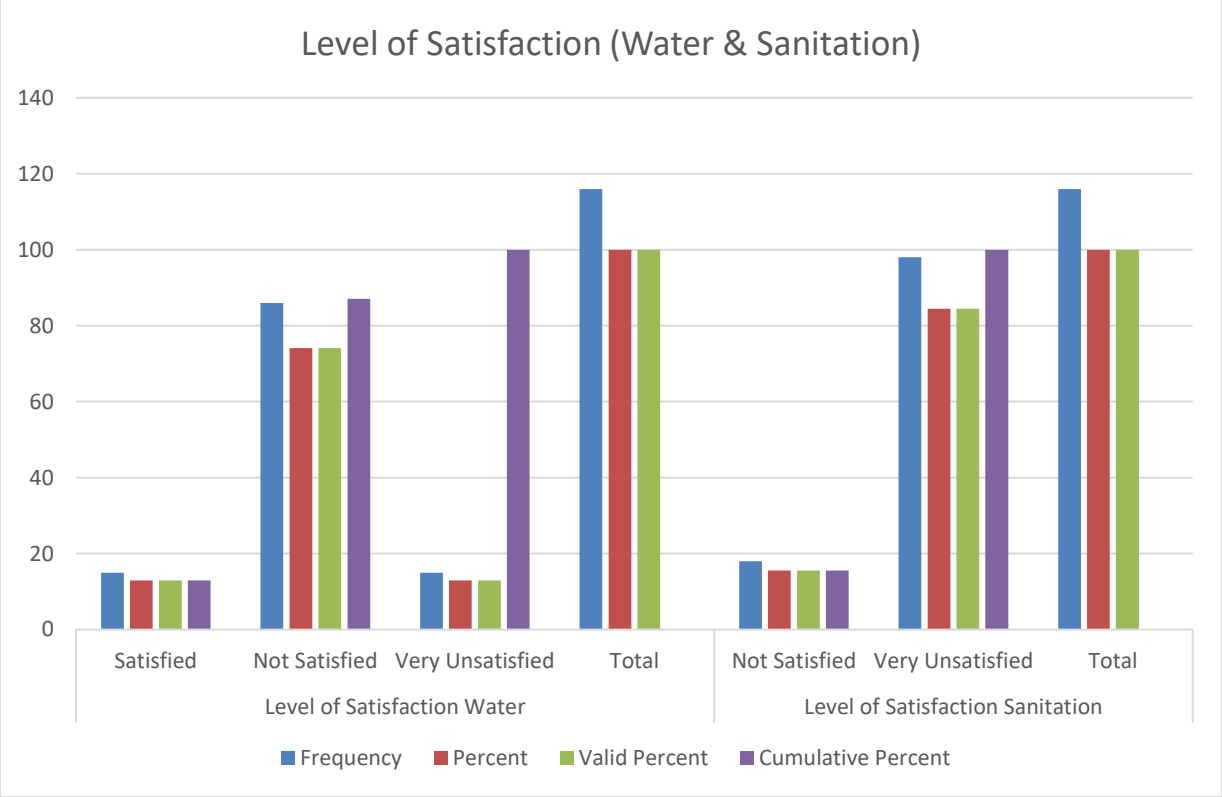

Figure 4. 4 Level of HHs Satisfaction on the services (Source, Author 2020)

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Access to improved water and sanitation remains a challenge for the poor urban population of Sub-Saharan African cities, particularly those who are living in poor peri-urban areas. Innovative planning approaches tailored to community conditions and that is based on the social context of each specific settlement are needed for faster progress in these areas to achieve access to basic drinking water and sanitation by 2030 as recommended by the United Nations Sustainable Development Goals (UN-SDG). Having access to safe drinking water and sanitation is central to living a life in dignity and upholding human rights

Out of the total 120 surveyed HHs living in Gulele sub-city was found that 69% of the HHs have a piped connection and 17% only account their main water sources are public taps, and the remaining 14% get their water from other sources. The majority of the households receive is highly episodic and the availability of water is on average 1 day per week with an average duration of lesser than 6 hours per day. Concerning its quality, 65% says the water is unacceptable and has a color. Regarding sanitation, the majority, 92% have a dry latrine and they don't have a fixed handwashing facility. In these toilets on average one latrine serves 12 people. On top of that, the septic tank is discharged to an open drain and it has a leakage sometimes. Besides, the topography of the area incurs high pumping costs. These impacts on HHs economic, physical problems, and nutritional loss by wasting

productive time and carrying heavy loads of water from the source to their home. Moreover, it affects the health of the community and the satisfaction of the customers.

For the question “who fetch water for the household?” the study revealed that 95% were adult women. This shows that women are disadvantaged, and their burden is beyond measure. Besides, it was identified that the level of water and sanitation facilities service is unsatisfactory for 93% of the households. The Poor level of satisfaction of the HHs was because of the water interruption.

Generally, fluctuation in access to the drinking water supply is due to a water supply shortage, irregular power supply, and the topography of the area. The majority of the respondent households reported perceived improvement of water service compared to a reasonable proportion who reported worsening of the service. This overall expected increased water demand found by this study due to the gradual deteriorations in the performance of the water system; inadequate and unreliable power with frequent and long-lasting power interruptions; old distribution network; inadequate pipes with many bursts along the mainline; damages to service pipes during road construction and other land use activities; severe and frequent technical failure; insufficient infrastructure, rapid and steady population growth, urbanization, better and modern style of life due to increased income, and water-intensive modern houses are also contributing factors are putting high pressure on the utility.

AAWSA’s lack of a common strategy, the multiplicity of institutions, institutional weakness, and absence of integration among the various service providing institutions to integrate their action plans and programs at the city level have resulted in massive pollution

of surface water resources. Lack of coordination has made the city suffer from the fragmented institutional arrangement and overlapping mandates with confusing duties and responsibilities hampering the ability of city leaders to address critical socio-economic and environmental challenges. Sectors' accountability differences since few are accountable to the city administration and others to the Federal State is contributing to the observed malfunctions.

5.2 Recommendations

This research has revealed the main challenges that the Addis Ababa dwellers, particularly the Gulele Sub-city slum areas community are struggling with water availability, accessibility, sanitation facilities problem, and above all, they are lacking good governance. The challenges that are pondered in this researcher need to be addressed by the concerned utilities and policymakers. The following recommendations were pointed out for considerations:

- ☞ Water interruption has to be well scheduled so that everybody gets water supply by a shift at a fair time gap rather than serving some area continuously while other areas stay without water service at all. This measure would minimize the inequitable distribution of scarce water supply among the community.
- ☞ Comprehensive whistleblowing legislation for the Sub-City Administration. It can play an important role in filling this accountability gap, as it allows both the dwellers and the local administration to report on wrongdoing. It has to have safe channels of reporting and strong and effective protection for those who chose to blow the whistle.
- ☞ Ministry integration; with institutions like Ministry of Water, Irrigation, and Energy (MoWIE), Addis Ababa Construction and Road Authority (AACRA), Ethiopian Electric Utility and Land Management Authorities, Ethiopian Telecommunication. Integration among the various service providing institutions to integrate their action plans and strategic programs at the city level have a huge advantage to efficiently use resources.

- ☞ Line change or digging a new well in the area; to avoid long-distance pumping challenge. Considering its groundwater accessibility and its chemical composition, digging a new well in the study area minimize the cost of long-distance surface water pumping.
- ☞ Renovating the existing unfunctional public toilets and make use of it. And to create connectivity with the city's existing sewer system or to prepare an environmentally appropriate area.
- ☞ Community participation should be encouraged in all aspects like resource contribution, decision making, and post-implementation management. The officials at different levels should listen to the voice of the slum area community and understand their interests rather than selling their ideas to the people.
- ☞ A holistic sanitation administration institutional arrangement, which has both horizontal and vertical integration among woredas and sub-cities, allows strong stakeholder participation and characterized by real decentralization of tasks and authority.

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Appendices 1. Questionnaires for Sample HHs in Gulele Sub-City Woreda

The questionnaire is prepared to conduct research in order to fulfill the requirement for MSc. Water Resource Management at Addis Ababa University. The main objective of the study is to assess the urban water supply and sanitation problem in Addis Ababa and come up with the possible recommendations that will improve and ensure the sustainability of the water and sanitation facilities of the woreda. The following questions are prepared for collecting information on the types of drinking water sources that your households use and the accessibility, availability and quality of drinking water and sanitation services. Hence, it is valuable to show the reality of how the water and sanitation facilities of the ground and forward a recommendation for the concerned utility office and policymakers to improve the water supply and sanitation facilities. Please be informed that your response is kept in confidential, and important for academic research only. Therefore, do not hesitate to give me the right and truthful information. Thank you for your time and consideration response.

Section I. Household Interview

A: Personal Profile

1. Sub-city _____
2. Woreda _____
3. Respondent Gender (Heads of the household) Male □ Female □
4. Educational Level _____
5. Income source of the family_____
   Self-employee □ Government employee □ Private firm employee □
   Daily labor□ Other_____
6. Total number of people who live in your house/family including the respondent, children and any dependent family member _____

B: **The current water supply in the area**

1. Please mention the **main** source of drinking water for your household?
   - ☐ Piped water
   - ☐ Public water
   - ☐ Delivered water (Tanker-truck)
   - ☐ Bottled water
   - ☐ Other (specify)
     .....

2. Time is taken to get water, and return back?
    - ☐ Do not collect
    - ☐ The number of minutes.....
3. Thinking of the last month, has there been any time when your household did not have sufficient quantities of drinking water when needed?
    - ☐ Yes, at least once
    - ☐ No, always sufficient

4. What is the **main** source of water used by members of your household for other purposes, such as cooking and handwashing?
    - ☐ Piped water
    - ☐ Rainwater
    - ☐ Delivered water (Tanker-truck)
    - ☐ Other (specify).....

5. Where is that water collected from? refer Q4?
    - ☐ In own dwelling
    - ☐ In own yard/ plot
    - ☐ Elsewhere

Water Accessibility

6. Members of your household use any other drinking water sources more than twice a month?
    - ☐ Piped water
    - ☐ Rainwater collection
    - ☐ Delivered water (Tanker-truck)
    - ☐ Water kiosk
    - ☐ Packaged water (Bottled water)
    - ☐ Surface water (river, stream, dam, lake, pond, canal, irrigation channel)
    - ☐ Other (specify).....
7. Who fetch water for your household in going to these alternative sources?
    - ☐ Adult woman (>15 years)
    - ☐ Adult man (>15 years)
    - ☐ Girl (<15 years)
    - ☐ Boy (<15 years)
8. In the last week, how many trips did that person make to get water?
    - ☐ Number of times.....
    - ☐ Don't know

Availability of water supply

9. How often do you get water for your household consumption (for drinking and other household use)
    - ☐ Every day
    - ☐ Once in a week

- ☐ Once in two weeks
- ☐ Once in a month
- ☐ Other (Specify)

  .....

10. Your main reason that you were unable to access sufficient quantities of water when needed?
    - ☐ The availability of water from the source
    - ☐ The water is too expensive
    - ☐ The accessibility of the source
    - ☐ Other (specify)

      .....
11. The water supplies you have now (if piped water) for how many hours per day is water supplied on average
    - ☐ 24 hours per day
    - ☐ 18-24 hours per day
    - ☐ 12-17 hours per day
    - ☐ 6-11 hours per day
    - ☐ <6 hours per day
12. For how many days was water from this source [Refer Q 1] unavailable when needed in the past month?
    - ☐ Number of days

      .....
    - ☐ Don't know
13. Does your household have a storage tank?
    - ☐ Yes
    - ☐ No

    If your answer for above question is 'Yes', please give a response from 14 – 16. Or else, leave it.
14. How many liters does the storage tank hold?
    - ☐ Number of liters

      .....
    - ☐ Don't know
15. If the storage tank been filled in the last week/month? How many times?
    - ☐ Number of week/month.....
    - ☐ Don't know.....
16. Did you encountered that you have not been able to store sufficient water to meet your needs in the last week/month?
    - ☐ Yes, at least once
    - ☐ No
    - ☐ Don't know
17. Can you show me the containers that your household store drinking water? (Observe whether containers are covered or uncovered)
    - ☐ Water not stored in small containers

- ☐ Water stored in covered containers
- ☐ Water stored in uncovered containers
- ☐ Unable to observe

Water quality/safety

18. Did you do anything to make your water safer to drink?
    - ☐ Yes
    - ☐ No
    - ☐ Don't know
19. If your answer is 'Yes' for the above question? Can you tell me what do you to make it safer to drink?
    - ☐ Boil
    - ☐ Add chlorine
    - ☐ Use water filter
    - ☐ Let it stand and settle
    - ☐ Other (specify)
      .....
20. The water supplied from your main source [W1] is usually acceptable? *If not, select the main reason.*
    - ☐ Yes, acceptable
    - ☐ No, unacceptable taste
    - ☐ No, unacceptable color
    - ☐ No, unacceptable smell
    - ☐ No, other
      (specify).....

C: Sanitation Facility

1. Tell me the kind of toilet facility do members of your HHs usually use?
   - ☐ Flush
   - ☐ Dry pit latrines
   - ☐ Public
   - ☐ Other (specify) .....
2. Is this toilet a shared facility with others who are not members of your household?
   - ☐ Yes
   - ☐ No
3. Where is this toilet facility located?
   - ☐ In own dwelling
   - ☐ Elsewhere
4. Are there times your latrine been emptied?
   - ☐ Yes emptied
   - ☐ Never emptied
5. If it was emptied, where were the residual emptied to? *Was it removed by a service provider?*
   - ☐ Removed by service provider
   - ☐ Emptied by household
   - ☐ Other (specify)

6. Do you know the number of HHs use this toilet facility, including your own household?
   - ☐ Number of households .....
   - ☐ Don't know
7. Do all household members usually use the sanitation facility?
   - ☐ Yes
   - ☐ No
8. Do you have access to everyone in the household to use the toilet at all times of the day and night?
   - ☐ Yes
   - ☐ No
9. Is there a leakage or overflow wastes at any time of the year?
   - ☐ No, never
   - ☐ Yes, sometimes
   - ☐ Yes, frequently
   - ☐ Don't know
10. Where does your septic tank discharge to? (Applies only to HHs using septic tanks)
    - ☐ To a sewer
    - ☐ To an open drain
    - ☐ To open ground or watercourse
    - ☐ Other (specify) .....
11. Tell me the total service year of your pit latrine/septic tank?
    - ☐ Number of years .....
    - ☐ Don't know
12. When was your pit latrine/septic tank last emptied?
    - ☐ Number of years .....
    - ☐ Don't know

D. Hygiene

1. Where is the place members of your household most often wash their hands?
   - ☐ Sink fixed facility
   - ☐ Mobile object observed
   - ☐ No handwashing place in dwelling/yard/plot
   - ☐ Other reason (specify)
2. Conduct an observe for the availability of water at the place for handwashing.
   - ☐ Water is available
   - ☐ Water is not available
3. Availability of soap or detergent at the place for handwashing check/observe.
   - ☐ Soap or detergent available
   - ☐ Soap or detergent not available

E: Satisfaction and preference of the household for water and Sanitation facilities

1. How you level your satisfaction by the water supply?

Very satisfied □ Satisfied □ Not satisfied □ Very unsatisfied □ Don't know?

2. Thinking about your sanitation facility, how satisfied are you?
   Very satisfied □ Satisfied □ Not satisfied □ Very unsatisfied □ Don't know?
3. If you are unsatisfied, what are the reasons? Its quality □Water interruptions □ Affordability □ All □ Other .....
4. While thinking about the Addis Ababa water supplier, how satisfied are you with their ability to provide you with reliable water services?
   Very satisfied □ Satisfied □ Not satisfied □ Very unsatisfied □ Don't know?
   If you are unsatisfied, please select any of the following statements that apply
   - ☐ The water services are too unreliable
   - ☐ The water services are too expensive
   - ☐ I don't trust them to provide a water service even when I pay for it
   - ☐ I am not confident that they will continue to provide water services
   - ☐ Any other reason……
5. Now, thinking about the providers of your sanitation service, particularly those who empty your toilet, how satisfied are you with their ability to provide you with reliable sanitation services?
   Very satisfied □ Satisfied □ Not satisfied □ Very unsatisfied □ Don't know?
   If you are unsatisfied, please select any of the following statements that apply
   - ☐ The emptying services are too unreliable
   - ☐ The emptying services are too expensive
   - ☐ I don't trust them to empty my toilet completely
   - ☐ I don't trust them to empty my toilet safely
   - ☐ I am not confident that they will continue to provide services
   - ☐ Any other reason……
6. Considering the past two weeks, have any members of the family had acute diarrhea consisting of at least three loose motions within a 24-hour period?
   - ☐ If yes, how much money did you spend on medical supplies or medical advice?
7. Who should better to manage and administer the water service?
   Government □ NGOs □ Private company □ Government and NGOs □ Government and
   private □ Other .....
8. How do you rate the effort of the government to deliver water and sanitation facility for you? Good □ Some efforts □ Poor/lack attention □

Section II. Key Informants Interviews

A. Interview for Addis Ababa Water and Sewerage Authority (AAWSA) Gulele District WASH Expert

1. Is it possible to know the number of water supply sources AAWSA have? Do they have sufficient capacity to produce the required amount of water for the three woreda?
2. Can you tell me the total cubic meter water produced for Gulele Sub-city?
3. The total percentage of the population served by these water productions?
4. The number of public taps in the woreda? Are the taps functional? How far are planted?
5. Who is responsible to maintain and to operate the overall function of public taps?
6. What mechanism do you use to allocate the water adequately?
7. If you rationed the water, do you announce their scheduled day for the people? If so, what media do you use?
8. Can you tell me the main reasons for water scarcity increasing in the sub-city?
9. Do you have a specific policy or mechanism to address water and sanitation facilities?
10. How often do you entertain complaints of the population in the Sub-city about the service of water?
11. Is there a database to access water supply for the last ten years? If yes, where do you place it in order to communicate others?
12. Is there a water and sanitation strategic plan for the coming years?
13. What are the mechanism you use to overcome the challenges of the organization in order to address the demand of the community?

B. Interview for Woreda Administration WASH Experts/ Health Workers

1. What are the main sources of water supply in the area? What are the alternative sources of water?
2. As a standard how far is the main water sources of water from the person's residence?
3. How do you communicate to the water providing utility/communication protocol?

4. What is your controlling mechanism of the supervisor of the public taps?
5. Is there a public toilet in the Sub-city? If yes, how many public toilets are there?
6. Are all public toilets being functional?
7. Do you think that the locations of the public toilets are proper and convenient for the community?
8. Is there a sewerage line that connects to the peoples/ public toilets? If not, what is the plan?
9. Is there a sewerage line that connects to the peoples/ public toilets? If not, what is the plan?
10. How is the hygiene custom of the woreda people?
11. What are the main diseases that are reported to the health workers during house visit?
12. What are the health education program the woreda has?
13. What are the major challenge in regard to sanitation and hygiene?

Appendices 2. Different Pictures Taken During Data Collection

Pic 1. Conducting an interview with Woreda 1 Resident. Pic 2. Interview Woreda 6 Admin. Health Unit Expert

Pic 3. Water Point Woreda 1

Pic 4. Public Toilet Woreda 5

Pic 5. Public Toilet Woreda 1

Pic 6. NGO Constructed Toilet for 3 HHs in Woreda 1

Pic 7. Waste water gorge at Woreda 5

Pic 8. Woreda 6 Administration Office