CHALLENGES OF POTABLE WATER MANAGEMENT PRACTICES IN LOKA ABAYA WOREDA, SIDAMA REGIONAL STATE

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Abstract

This study aimed to assess the Challenges of Potable Water Management Practices in Loka Abaya Woreda, Sidama Regional State. A cross-sectional research design with a mixed-methods approach was employed. 192 households were selected using stratified random sampling. The data collected through the questionnaire were cleaned, coded, entered, and analyzed using SPSS version 21. The analysis used percentages, frequencies, means, standard deviations, and Chi-square tests. The data collected through key informant interviews and focus group discussions were analyzed qualitatively using narrative analysis to enhance triangulation. The results indicated that piped water was the primary source of water for households in the study area. Family size, distance, and income had a significant effect on household water consumption. The majority of respondents were not satisfied with the existing water supply. That means the Loca Abaya Woreda water supply cannot meet the community's water demand with its existing capacity. As a result, the community faces problems such as health issues, spending significant time collecting water, high water costs, poor sanitation, and conflicts. These challenges result from urbanization, population growth, low water pressure, and poor water system maintenance.

Keywords: Challenges, Loka Abaya Woreda, Potable water

1. Introduction

Human life, like that of all animals and plants on the planet, depends on water. Not only do we need water to grow our food, generate power, and run industries, but we also need it as a basic natural resource for the survival of life. Our bodies need a daily supply of water to function properly. Human beings can live longer if they are deprived of food for a specific period. However, Humans cannot survive for more than a few days without water. Fresh water is one of the most essential natural resources for human beings. Water is literally the source of life on Earth, and there is no substitute for it; it can be said that water is life (Díaz et al., 2015).

The United Nations reports that approximately 1.1 billion people lack access to safe drinking water,

and this is compounded by the fact that 2.4 billion people lack access to adequate sanitation (Colón et al., 2015). This implies that hundreds of millions of cases will mainly be water-related illnesses, and more than five million deaths will occur every year (Asamoah, 2018).

Ethiopia is among the countries with the least access to potable water supply. According to Meseret (2008), only 30% of the population in 2001 had access to potable. Approximately 70% of the population will be without access to potable water, with 70% of this number residing in urban

areas. The percentage of the population with access to potable water is expected to increase slightly to 34% in 2003 and 47.3% in 2006 (PASDEP, 2006). This will be due to actions taken by the relevant government agencies and NGOs that provide water supply services. Data from the Ministry of Health of the Ethiopian government indicate that in 2008, the top 10 diseases nationwide were primarily sanitation-related.

Water is one of the necessities that ensure human existence. No one can lead a sustainable and healthy life without a safe water supply. Regarding the study area, evidence suggests that the water supply is insufficient to meet residents' demand (HWRDO, 2015). As a result, people in the Woreda usually switch to using various sources of water, such as rivers, springs, and unprotected healthy water, instead of the potable water supply.

Every year, diarrheal illnesses claim the lives of around 1.8 million people worldwide, and 663 million people lack access to a clean water source. Of these, poor hygiene, inadequate sanitation, and contaminated water sources account for 88% of diarrhea cases. This is also true in Sub-Saharan Africa, where the least number of countries have access to better drinking water supplies. Ethiopia is among the nations in sub-Saharan Africa dealing with a similar issue (JMP, 2015).

According to Loka Abaya Woreda's (2018) annual report, there are about 105 water supply schemes. However, water schemes were not accessible and sustainable. People still walk longer distances, and waiting times are high; women and girls waste time fetching water. As a result, people in the study area are facing the problem of an improved drinking water supply.

The MOWR Annual Report (2017) states that the country's overall water supply coverage in 2015–2016 was 52.46%, with 46.39% of the population living in rural areas and 82.02% in urban areas. The same source claims that service coverage has increased by 5% from the prior fiscal year. It is evident that about half of the population lacks access to a clean water source. Additionally, compared to other regional states, there is a significant difference between regions with very limited access to a safe water supply. According to the municipal office and elders, the majority of residents are facing excessive expenses from the previous fiscal year and a severe lack of drinkable water. It is evident that about half of the population lacks access to a clean water source. Additionally, compared to other regions, there is a significant difference between those with very limited access to a safe water supply. According to the municipal office and the elders, most residents are paying exorbitant fees and facing a serious scarcity of drinkable water.

As the researcher observed, the problem of water supply in the study area is not only one of adequacy and quality but also one of distribution and reliability. As a result, low- and medium-income residents in the study area incur additional water-related living costs daily. Therefore, this study was designed to assess the Challenges of Potable Water Management Practice.

A study of Assossa Town's urban water supply was conducted by Assefa Delesho in 2006. His research

primarily focused on the causes of water issues in Assosa town. According to his research, Assosa town's water supply cannot meet residents' demands due to both the town's growing population and its limited capacity.The other study, conducted by Meseret Belachew (2012), assessed water quality and the determinants of household potable water consumption in Simada District, Ethiopia. His study revealed that the water supply in urban areas is generally superior to that in rural areas. But water costs are considered very high in urban areas, especially for people living in poverty. In rural areas, people did not use constructed water points due to their inadequacy, distance, and longer waiting times.

In addition to the above research, a similar study has been carried out in Ambo town by Chala Deyissa (2011) under the title of "An assessment of urban water supply. In addition to the above research, a similar study has been carried out in Ambo town by Chala Deyissa (2011) titled "An assessment of urban water supply and sanitation: The case of Ambo town, Oromiya region". National studies, however, showed that water supplies varied by location and by domicile, and that use was lower than in other nations. Additionally, earlier research projects did not adequately address the challenges of potable water management. To close the gap left by previous researchers, this study sought to evaluate the main aspects of water supply and demand in Loka Abaya Woreda, Sidama Regional State, and the difficulties associated with potable water management.

1.1 Conceptual Framework

As discussed in the review of related literature section of the thesis, the linkages among key variables of the study, such as practices, challenges, and current status of potable water management, are presented in the figure as follows: -

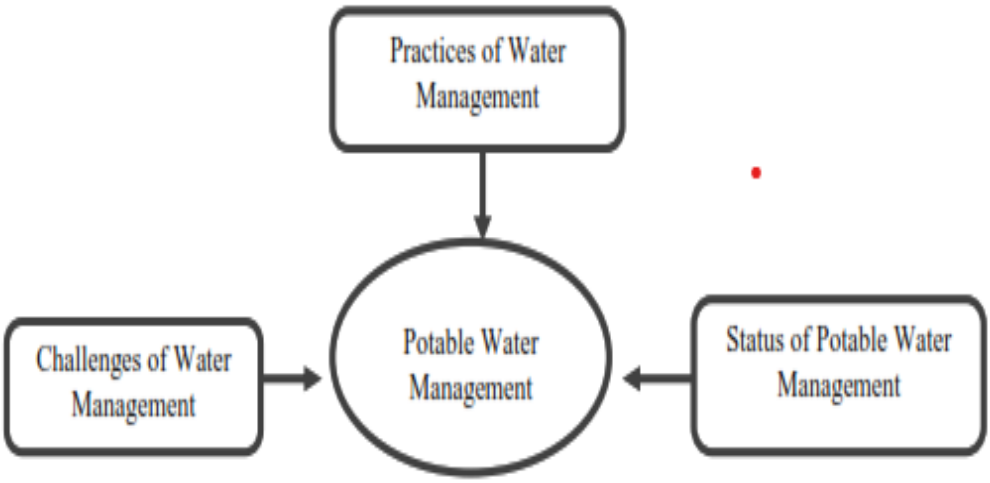

Figure 1: Conceptual Framework of the Study

Source: Authors' own Sketch based on review of literature, 2022.

2. Review of Literature

2.1 International and Continental Approaches to Portable Water Problems

The necessity of water for human survival is universal and is well recognized worldwide. Water is a critical resource, as it is crucial to biological survival, agriculture, industry, energy generation, and human health (Díaz et al., 2015). Globally, an estimated 1.1 billion individuals do not have access to clean drinking water, and 2.4 billion people do not have access to proper sanitation (Colón et al., 2015), which are factors that contribute to the proliferation of water-related diseases. These global statistics underscore the gravity of the situation faced by low-income nations, including Ethiopia, where water supply systems remain underdeveloped.

The worst cases of water scarcity are witnessed in Sub Saharan Africa. Poor sanitation, unsafe water, and lack of hygiene are identified as the causes of a large percentage of diarrheal diseases in the area (estimated at 88%), (JMP, 2015). The article under review makes an appeal to the greater susceptibility of the African communities by stating that inadequate water management systems increase their exposure to the diseases, lessen their productivity, and overwhelm already weakened health systems. The same sentiments are reiterated by Asamoah (2018) who says that water related diseases cause significant mortality rate in the African nations.

Another trend in the world that affects the scarcity of water is urbanization. Due to the high rate at which urban development is taking place in developing nations, the available water infrastructure is strained as Li, Endter Wada, and Li (2015) assert. The informal settlements and the outskirts of urban areas are the places where the water services are often poor, which contributes to the further disparities in the urban and rural masses. These are captured in the Loka Abaya scenario, in which previous studies cited in the article indicate that water scarcity is skewed toward homes located far from formal water points.

2.2. Water Supply Scenario in Ethiopia

Ethiopia has been one of the least penetrated countries in Sub-Saharan Africa for potable water. Meseret (2008) reports that in 2001, only 30 percent of the Ethiopian population had access to potable water, but this improved to 47.3 percent in 2006 with interventions by the government and non-governmental organizations. According to the Ministry of Water Resources (2017), the national coverage of water supply was 52.46% in 20152016, which is why the situation is gradually improving but still has gaps. The rural population has yet to receive adequate service coverage, and water infrastructure is often in poor condition due to inadequate maintenance.

Studies in Ethiopian regions have continued to highlight the poor condition of current water systems. Indicatively, the works by Assefa (2006) and Meseret (2012) indicated that high population growth, limited capacity in the water schemes, and high water prices are among the factors that have led to chronic shortages. There is a tendency of rural households to use unsafe sources of water e.g., rivers, unprotected springs, and ponds, which is also the same trend in the Loka Abaya study area. The results of this study align with the broader literature, which identifies infrastructural deterioration, inadequate funding, the community's inability to manage, and poor institutional coordination as the main limitations to sustainable water supply systems. According to Kimani et al. (2007), the lack of clean water negatively affects

sanitation, particularly in densely populated areas, leading to environmental health issues.

2.3. Determinant Facts and Household Water Consumption

As noted in the article and in many other studies, household socioeconomic factors are significant in water consumption. The most important variable is family size: larger families use more water and face greater challenges in the event of a water shortage. Such a correlation is reported in the article reviewed and in the previous literature. For example, Meseret (2012) found that household size has a positive correlation with daily water demand, particularly in rural environments.

Another very significant determinant is distance to water sources. The households that are distant to water points are likely to use less water as the time and energy expenses of collecting water would be high. The same was also noted by Wondimu (2016) which was cited in the uploaded article that household that used shared links, taps, or uncovered springs used less water per household. This goes in line with international reports that suggest that longer distance of travelling deters the most desirable water use and poses a gendered problem whereby women and girls are usually the ones who are charged with the duty of collecting water (Joshi and Fawcett, 2001; Fenet and Alemayehu, 2016).

Household water preferences are also determined by income. The increase in income level families is generally noted to have more water consumption because of the capacity to purchase bigger storage facilities, alternative water supplies or connection to the home. This connection is substantiated by the data of Venkatachalam (2015), who reported that the readiness of the low-income urban population to pay their water services is limited due to the affordability issues. This tendency is supported in the uploaded article, which shows that households with higher monthly income had much higher water consumption.

Problems of Portable Water Supply and Management

2.3.1 Infrastructure Constrained and Ineffective Maintenance

The second theme that has been repeated in the literature is the degradation of water infrastructure. According to Ngima (2015), the lack of water, malfunctioning pumps, and poor maintenance result in irregular water supply in rural Kenya, a situation similar to that in Ethiopia. In the reviewed article, the researchers mention that the main cause of the water shortage in Loka Abaya is the improper maintenance of wells, boreholes, and the distribution schemes.

2.3.2. Urbanization and Population Growth

Due to urbanization, water scarcity is exacerbated by pressure on supply infrastructure. The same conclusions can be drawn by Laschefski (2018), who argues that rapid population growth leads to environmental pollution, increased extraction of water resources, and unbalanced hydrological processes. The article under review cites urbanization and population growth as the major contributors to water shortages, which align with other evidence from around the globe.

2.3.3 Economic and Social Implications

Severe socioeconomic effects are caused by high water prices, long lines at water points, and wasted time traveling to get water. Both Ngima (2015) and Kimani et al. (2007) mention the economic cost and health consequences of poor water services. The article uploaded supports this point of view, claiming that water deficit has more severe effects,

including increased health and sanitation issues, conflict, and lower household productivity.

3. Community Management and Governance Problems

Sustainable water provision requires community involvement, good governance, and support from institutions. According to research by Fenet and Alemayehu (2016), Smiley (2018), and Hardoy et al. (2013), local governments lack the resources and technical capacity to operate water schemes, so the system fails. The article under review also highlights gaps in community awareness, inadequate operation of water schemes, inadequate documentation, and inadequate support from local authorities. These are some of the weaknesses that make it difficult to be sustainable in the long term.

Governance failures are also a cause not only of technical issues but also of social disputes, including water access, as reported by Janakarajan (2002). The Loka Abaya case shows that the majority of respondents (74.1%) experience conflict due to water scarcity, indicating the externalities of poor water governance systems.

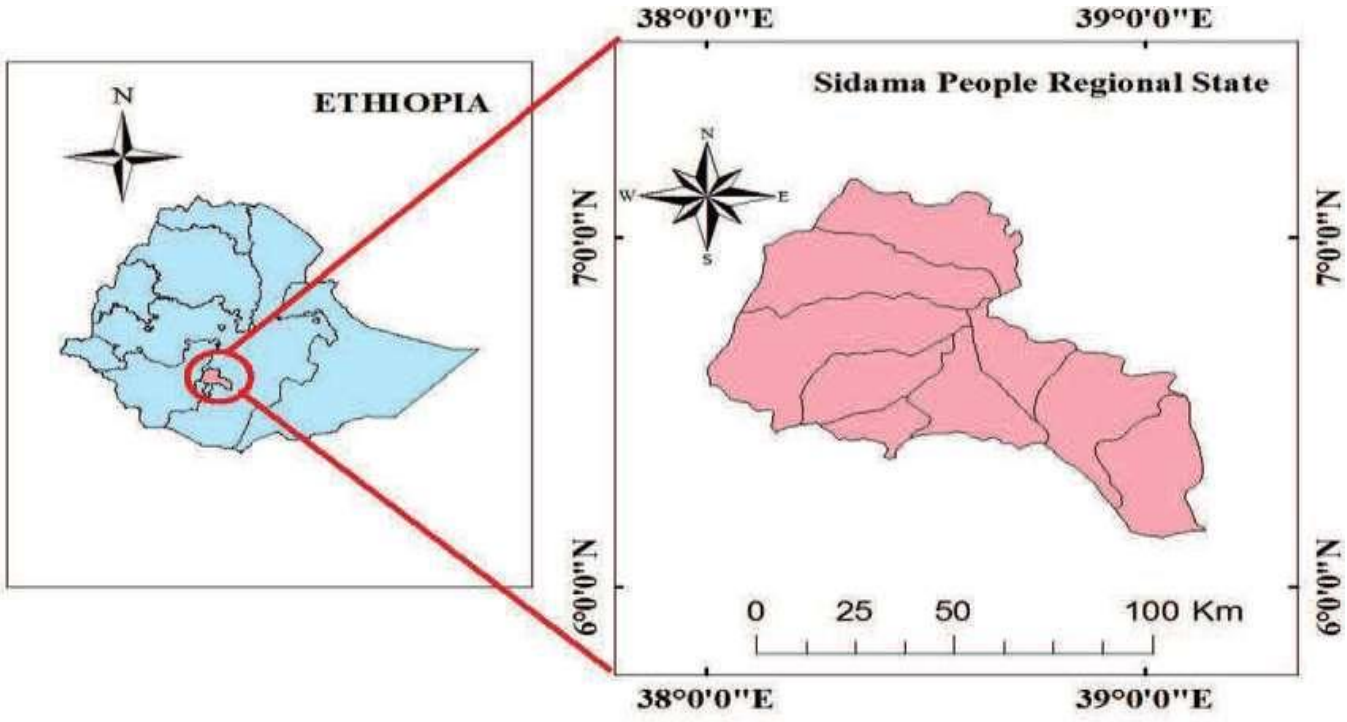

Figure 2: Location Map of Sidama National Regional State
Source: BoFED, 2022

3. Materials and Methods

3.1 Description of the study area

The study was conducted in Loka Abaya Woreda. The Woreda is located West of Welayta, North of Boricha, South of Oromiya, East of Aleta Chuko, and southwest of Lake Abaya. Loka Abaya woreda has 24 kebeles, including the municipality of the town. According to Central Statistical Agency (CSA) reports, the woreda's total population is 117,269. Out of these, 59808 are male, and 57461 are female.

3.24. Sample Size and Sampling Procedure

2.4.1. Sample size

To determine the sample size for gathering information from residents about their management techniques for the town's potable water supply and their opinions of these procedures, the sample size was determined. The researcher used a multi-stage sampling technique to select the sample and determine the sample size. Based on factors such as geographic location, population density, and the accessibility of various infrastructure, the Woreda was first divided into four distinct strata: kebeles on the north side of the town, kebeles on the south side, kebeles on the east side, and kebeles on the west side. In the second phase, the researcher used a random selection technique to choose four kebeles, one from each stratum.

In terms of population density, infrastructure accessibility, and proximity to the Woreda center, the researcher found that the kebeles within each stratum shared similar characteristics. Therefore, selecting one kebele from each stratum can be helpful. In the third stage, the researcher selected a total sample of 192 households from four sampled kebeles, using the formula developed by Yamane (1967). The formula is stated as

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

Where: ***n*** = Sample size

N = Total Population

e = Sampling Error

$$n = \frac{3075}{1 + 3075\ (0.07)}$$

n =192

Table 1: Sampling Frame

Kebele	Household Heads Size	Sample size determined
Dase Kebele	539	34
Kura Keble	634	39
Sala Kebado Kebele	721	45
Arada Gale Kebele	1181	74
Total	**3075**	**192**

In the fourth stage, individual respondents from the sampling frame were selected using systematic random sampling. First, the respondents were selected from the list of household heads at the kth interval (k = Ni/ni). Accordingly, the value of k was 16. Next, the first individual (i) was randomly selected from the set {1, 2, ..., 16}. Then, the second respondent was the (i+16th) household head, followed by the (i+32nd), and the same step was repeated until 192 household heads were included in the study.

2.5. Method of Data Collection

Two questionnaires, both open- and closed-ended, were created to investigate the Woreda people's practices and capabilities for providing drinkable water, as well as the activities households engage in in this regard. To ensure that the sampled respondents could easily comprehend it, this questionnaire was first written in English and then translated into the local language. About 20 questionnaires were pre-tested at random after preparation to identify and fix any unclear or deceptive items. At that point, two data collectors assisted in collecting all the questionnaires from the samples. Additionally, semi-structured interviews proved useful for collecting primary data.

2.6 Method of Data Analysis

Both quantitative and qualitative data analysis methods were used in the study, which aligned with the mixed-methods research design. The quantitative data gathered using structured questionnaires were initially cleaned, coded, and entered into SPSS version 26, and statistical analysis was performed, including descriptive statistics (frequencies, percentages, means). Standard deviations were calculated, and Chi-square tests were used to assess relationships among the

major variables, including family size, income, distance to water sources, and household water consumption. The analysis of qualitative data collected through interviews with key informants and focus group discussions was conducted using narrative (thematic) analysis to supplement the quantitative findings and to learn more about the experiences, perceptions, and challenges of potable water management in communities. The combination of these methods enhanced triangulation and ensured a more holistic conception of water supply problems in Loka Abaya Woreda.

3. Results and Discussion

3.1 Background Characteristics of Respondents

3.1.1. Age, Sex, Education, and Occupation

Understanding the profile of the respondents included in the study requires analyzing their background characteristics. Consequently, Tables 4.1 and 4.2 present the analysis and describe the respondents' sex, age, occupation, and educational attainment.

Table 2: *Distribution of Respondents by their Sex and Age*

Variables	Category	Frequency (n)	Percentage (%)	Mean
Sex	Male	135	76.3	
	Female	42	23.7	
	Total	177	100	
Age	15-24	12	6.8	36.7
	25-34	71	40.1	(8.52)
	35-44	66	37.3	
	45-54	21	11.9	
	Above 64	7	4.0	
	Total	177	100	

Source: Field survey, 2022

As shown in Table 2, among the total number of respondents, 76.3% them were males, and the remaining 23.7% were females. Regarding the respondents' ages, 40.1% were in the 25-34 age group, and 37.3% were in the 35-44 age group. The remaining 11.9% of respondents were in the 45-54 age group. The remaining 6.8% and 4% were found in the 15-24 and above 64 age

categories, respectively. The average age of household heads in the research region is 36.7 years, as age is a continuous variable measured in years. This suggests that most participants were discovered to be in a productive age range.

Table 3: Distribution of Respondents by their Educational Level and Occupation

Variables	Category	Frequency (n)	Percentage (%)
Educational level	No formal education	14	7.9
	Grade 1-4	9	5.1
	Grade 5-8	7	4.0
	Grade 9-10	9	5.1
	Grade 11-12	27	15.3
	Certificate	25	14.1
	Diploma	30	16.9
	Degree and above	56	31.6
	Total	**177**	**100**
Occupation	Government employee	69	39.0
	NGO employee	48	27.1
	Self employed	21	11.9
	Trade	28	15.8
	Farmer	11	6.2
	Total	**177**	**100**

Source: Field survey, 2022

The results in Table 3 indicated that 31.6% of respondents held a degree or higher, while 16.9% held a diploma. Furthermore, 20.4% and 9.1% of respondents attended secondary school (grades 9-12) and primary school (grades 1-8), respectively. The remaining 7.9% of sampled respondents did not attend formal education.

Regarding respondents' primary occupation, 39% in the study area were government workers, while 27.1% were non-governmental (NGO) workers. On the other hand, 15.8% of them were traders. The remaining 11.9% and 6.2% of the sampled respondents were engaged in private work and farming, respectively.

3.1.2. Marital Status, Household Size, and Income of Respondents

Under this sub-topic, respondents' marital status, household size, and family monthly income have been analyzed and presented in Table 4.

Table 4: *Respondents by their Marital Status, Household Size and Monthly Income*

Variables	Category	Frequency (n)	Percentage (%)	Mean (SD)
Marital Status	Single	19	10.7	
	Married	158	89.3	
	Total	**177**	**100**	
Household Size	1-4	61	34.5	5.15
	5-8	111	62.7	
	9-12	5	2.8	(1.527)
	Total	177	100	
Household monthly income	Below 2000	42	23.7	
	2001-4000	109	61.6	
	Above 4000	26	14.7	
	Total	**177**	**100**	

Source: Field survey, 2022

The majority of respondents (89.3%) were married, while 10.7% were single, as shown in Table 4. Regarding respondents' household size, the majority (62.7%) lived in households of 5 to 8 people. Additionally, 34.5% of the homes were between one and four people in size. According to the remaining 2.8% of respondents, nine to twelve people were living in their family. Additionally, the survey revealed that the average house size under investigation was 5.15. The research area's typical family size is higher than the regional average of 4.9 (DHS, 2011). This suggests that a larger family uses more water when there are more people. According to the analysis, the majority of respondents (61.6%) made between 2001 and 4000 birr per month. Furthermore, 23.7% of them made less than 2000 birr, while only 14.7% made more than 4000 birr.

3.2.1. Main Source of Water for Households

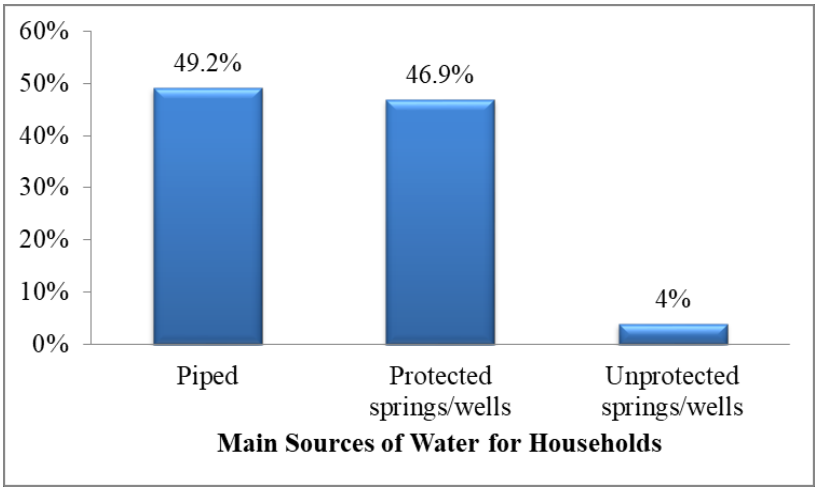

Figure 3: Main Source of Water
Source: Field Survey

As shown in Figure 3, 49.2% of households' main source of water is piped water. On the other hand, 46.9% of households' main source of water is protected springs. The remaining 4% of households get water from an unprotected spring.

Table 5: *Respondents' Response on Source and Daily Average Consumption*

Variables	Category	Frequency (n)	Percentage (%)
If it is piped, where is the source connected?	In your house	28	32.2
	In your plot	38	43.7
	In the neighbor's house	16	18.4
	Public tap	5	5.7
	Total	**87**	**100**
Daily average consumption of water per household (in liters)	10-20L	8	4.5
	21-30L	46	26.0
	31-40L	41	23.2
	Above 40L	82	46.3
	Total	**177**	**100**

Households with piped water were asked about the source of their connection, and 21.5% reported that the connection was in their own plot, while 15.8% reported that it was in their own house. The remaining 9% of sampled respondents indicated that the piped water was connected to a neighbor's house, whereas 2.8% received piped water from a public tap. Similarly, Wondimu (2016) found that the majority of households depend on their own plot tap, public tap, and vendors for their primary water sources, while a small number depend on a house connection, a shared yard connection, and an unprotected spring.

In connection with daily average consumption, 46.3% of respondents consume more than 40 liters of water per day per household. The other 26% and 23.2% of respondents consume 21-30 liters and 31-40 liters of water per household per day, respectively.

Furthermore, the key informants added that although they use different materials to fetch water, the majority of households in the study area use a plastic tank or a jerry can to collect water for household use. Most of the *jerry cans* used in the area were 15, 20, 25, and 30 liters.

Table 6: Alternative Source, Distance and Time to Fetch Water

Variables	Category	Frequency (n)	Percentage (%)
Alternative sources of water during a dysfunctional or low supply	Unprotected spring	95	53.7
	Pond	46	26.0
	Rain water	36	20.3
	Total	**177**	**100**
In which season is the quantity of water supplied lower than demand?	Dry season	118	66.7
	Wet season	35	19.8
	Other	24	13.6
	Total	**177**	**100**
How far does it take you to walk to an alternative water source?	Within 100m	98	55.4
	100m -1000m	73	41.2
	Over 1000m	6	3.4
	Total	**177**	**100**
How long does it take (in minutes) to go to an alternative water source and	< 5min	11	6.2
	5 to 30min	55	31.1
	> 30min	111	62.7

return?	**Total**	**177**	**100**

Source: Field survey, 2022

Regarding alternative water sources, 53.7% of respondents use an unprotected spring, while 26% use a pond as an additional source during periods of low water supply. The remaining 20.3% of them get their daily water from rainfall, which they harvest and store in large water containers.

Regarding the season when the quantity of water supplied falls short of demand, 66.7% of respondents answered that it is during the dry season, while 19.8% answered that it is during the wet season. On the other hand, 20.3% of them responded it has no specific season. According to the key informant's interview and focus group discussion, during the wet season, the community has alternative water sources, such as rainwater. This implies that during the dry season in the study area, the water supply is lower than demand.

Regarding the distance, respondents who have no access to piped water travel to fetch water, 55.4% indicated they travel 100m. The other 41.2% of sampled respondents travel between 100m and 1000m, and the remaining 3.4% travel over 1000m to get water. Regarding the time taken to go to the water source and return, 62.7% of sampled respondents reported traveling more than 30 minutes, and 31.1% reported traveling 5 to 30 minutes. The remaining 6.2% reported walking less than 5 minutes to get water. The focus group discussions also revealed that women, boys, and girls spend time collecting drinking water.

3.2.2. Responsible Body in Collecting Water and Related Issues

In this subsection of the study, the results of the analyzed data regarding the responsible body for collecting water and related issues are presented in Table 7.

Table 7: *Responsible Body and Frequency of Collecting Water per Day*

Variables	Category	Frequency (n)	Percentage (%)
Who is responsible for fetching water in the household?	Mother	135	76.3
	Children	16	9.0
	Other	26	14.7
	Total	**177**	**100**
How often do you collect water in one day?	Once	96	54.2
	Two times	49	27.7
	Three times	27	15.3
	More than three	5	2.8
	Total	**177**	**100**

Source: Field survey, 2022

The results of Table 7 indicate that 76.3% of respondents answered that collecting water is the mother's responsibility, 9% agreed that it is the children's responsibility, and the remaining 14.7% consider it a common household task. This shows that in the study area, women bear a greater burden of collecting clean water than other household members.

According to the survey results, 54.2% of the communities travel to the water source once a day, and 27.7% travel twice a day. The remaining 15.3% and 2.8% travel three times or more per day, respectively. The key informants also reported that community members were fetching clean drinking water once a day because the water source was located a long distance away, requiring time to fetch it and queuing at the source. However, they travel more than one to fetch water for washing and other activities that are not safe for drinking purposes.

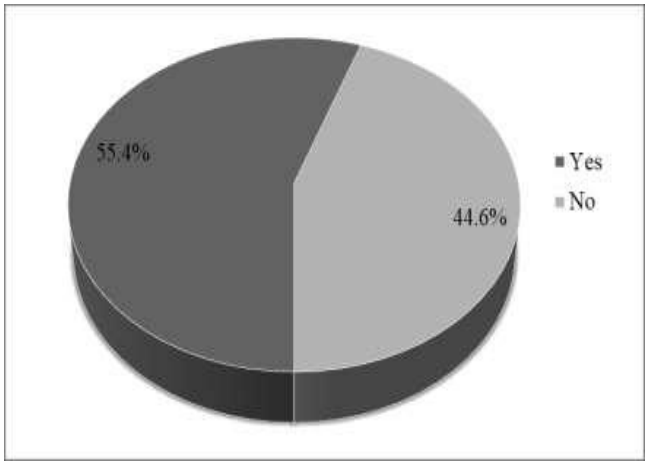

Figure 4 Respondents' chemical treatment usage at home

Source: Field survey, 2022

Regarding chemical treatments, respondents were asked whether they use any in their homes. Accordingly, Figure 4.2 shows that 55.4% of households reported using household-level water treatment chemicals. Conversely, about 44.6% of households in the study area did not use any chemical treatment.

3.3. The effect of family size, distance, and income on household water consumption

Under this topic, the effects of family size, distance, and income on households' water consumption were analyzed using *Chi*-square analysis.

3.3.1. The effect of family size on household water consumption

Table 8: *The Effect of Family Size on Household Water Consumption*

	Daily average consumption of water in the household								x^2	p-value
	10-20L		21-30L		31-40L		Above 40L			
	N	%	N	%	n	%	n	%		
1-4	5	62.5	21	45.7	15	36.6	20	24.4	13.69	0.033
5-8	3	37.5	25	54.3	26	63.4	57	69.5		
Total	8	100	46	100	41	100	82	100		

3.3.2. Effect of Income on Household Water Consumption

Table 9: *The effect of income on household water consumption*

Income	Daily average consumption of water in the household								x^2	p-value
	10-20L		21-30L		31-40L		Above 40L			
	N	**%**	**n**	**%**	**N**	**%**	**n**	**%**		
Below 2000	2	25.0	12	26.1	10	24.4	18	22.0	14.37	0.026
2001-4000	6	75.0	34	73.9	24	58.5	45	54.9		
Above 4000	-	-	0	0.0	7	17.1	19	23.2		
Total	8	100	46	100	41	100	82	100		

Source: Field survey, 2022

Regarding the relationship between household water consumption and income, among the sampled households, the percentage of households that earned a monthly income of 2001-4000 was greater for 10-20L daily average consumption of water (75%) than others, while the percentage of households that earned above 4000 monthly income was greater for above 40L daily average water consumption (23.2%) compared to others. Moreover, the *Chi*-square analysis ($\chi 2 = 14.37$) showed a statistically significant association between monthly income and household water consumption ($P = 0.026$).

3.3.3. Effects of distance on household water consumption

Table 10: *The effect of distance on household water consumption*

Distance in Km	Daily average consumption of water in the household								x^2	p-value
	10-20 L		21-30 L		31-40 L		Above 40 L			
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**		
Within 100 m	8	56.3	34	73.9	21	51.2	35	42.7	19.3	0.004
100m-1000 m	0	0.0	12	26.1	18	43.9	43	52.4		
More than 1000 m	0	0.0	0	0.0	2	4.9	4	4.9		
Total	8	100	46	100	41	100	82	100		

Source: Field survey, 2022

Regarding the effect of distance on household water consumption, the percentage of households that travel 100 meters was higher for those consuming 20-30L (73.9%) than for those consuming 0-10L (65.4%). In contrast, the percentage of households who travel 100-1000 meters was higher among households that consume above 40L (52.4%) than among others. Additionally, the *Chi*-square analysis ($\chi 2 = 19.3$) showed that distance and household water consumption have a statistically significant association ($P = 0.004$). This implies that households that travel a small distance consume more water than households far from the water source.

3.4. Challenges of Water Supply in the Study Area

Under this section, the challenges of water supply and related issues were analyzed and presented.

3.4.1. Respondents' satisfaction with the existing water supply and Related Issues

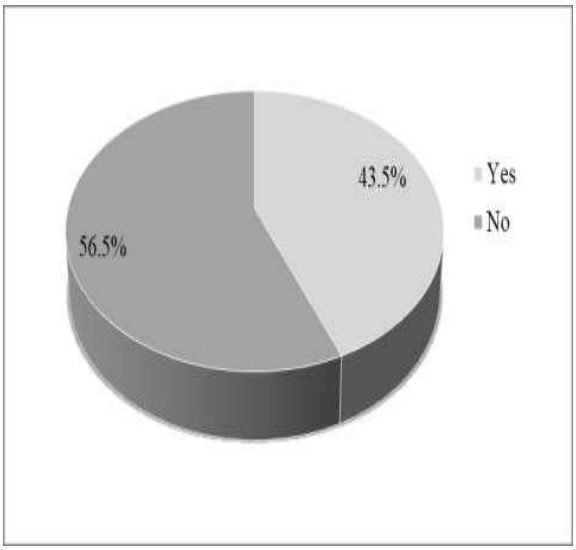

Figure 5: Respondents' Satisfaction with the existing water supply

Source: Field survey, 2022

According to the survey results, almost 56.5% of respondents were dissatisfied with the current water supply in the research area, as shown in Figure 5. The public sector will be responsible for providing piped water, in particular, and urban physical services in general, according to Hardoy, Mitlin, and Satterthwaite (2013). However, local governments frequently encounter significant challenges in meeting the basic needs of their inhabitants due to rapid population growth.

Table 11: *Respondents' Reasons for not being Satisfied with the Existing Provision of Water Supply*

Reasons for dissatisfaction	Frequency (n)	Percentage (%)
Most of the time, water is not available	24	24.5
Facilities are deteriorating	8	8.2
The amount of water is not enough	56	57.1
The scheme is non-functional	10	10.2
Total	**98**	**100**

Source: Field survey, 2022

Regarding the reasons for dissatisfaction, 57.1% of respondents cited water shortages, and 24.5% cited the unavailability of water. The remaining 10.2% and 8.2% of them were unsatisfied due to the non-functionality of the pipe and facility deterioration, respectively.

3.4.2. Types of problems encountered as a result of the shortage of water

Table 12: *Types of problems encountered as a result of the shortage of water*

Types of Problems	Yes	
	n	**%**
Health-related problem	123	88.5
Much time is spent collecting water	98	70.5
High cost of water	116	83.5
Poor sanitation	109	78.4
Conflicts	103	74.1

Note: Multiple responses are possible

Source: Field survey, 2022

3.4.2.1. Health-related problem

Respondents cited health-related issues (88.5%) as one of the problems they faced due to water scarcity in the study area, as shown in Table 12, along with other issues they reported. In addition, key informants and focus group participants noted that when wells are constructed, they are often not adequately maintained due to a lack of funding and lower levels of education among users of the water supply. As a result of diarrheal infections that might be avoided with clean water, children die from starvation and dehydration. According to Ngima (2015), techniques for collecting water might cause bodily harm, such as holding water containers on the head, which puts strain on the spinal cord from the weight of the water, or on the back, which damages the hip joints. It's also possible that the physical harm resulted from the distances covered during water transportation. One's health might suffer if they were lugging water upstairs, over a mountainous road, or over lengthy distances. If this occurs regularly, the economy may suffer since a large sum of money may be required to treat the illness.

3.4.2.2. Much time is spent collecting water

As the study results show, the majority (70.5%) of respondents spent most of their time collecting water. In addition, key informants reported that respondents waste time waiting for water, particularly in lengthy lines. Additionally, they mentioned that women and young girls are crucial in obtaining and transporting water. To get the water they require each day, they frequently trek for most of the day. Because they travel so far from their villages every day, they are also more vulnerable to violence. Fenet and Alemayehu (2016) reported that women are the gender most commonly engaged in water collection, which is consistent with this conclusion. They waste a lot of time waiting for water when that time could have been spent on other development-related tasks.

3.4.2.3. High cost of water

As indicated in Table 12, the majority (83.5%) of households spent a significant amount on water, depending on the number of household members. Similarly, Ngima (2015) found that households spent a significant amount on water, depending on household size.

This has negatively impacted economic development, as significant funds are spent on acquiring water that could have been used for other productive activities. The cost of water for community members who relied heavily on water vendors and kiosks was high.

3.4.2.4 Poor Sanitation

According to the study results, 78.4% of respondents reported poor sanitation in the study area. According to Kimani et al. (2007), water shortage has a major effect on sanitation in an area, especially in urban areas.

3.4.2.5 Conflict

In the context of conflict, the analysis shows that conflict (74.1%) is one of the problems arising from water shortages in the study area.

3.4.3. Cause for Water Supply Shortage

Table 13: *Causes for Water Supply Shortage*

Causes for the water supply shortage	***n***	**%**
Urbanization	144	81.4
Population growth	102	57.6
Low water pressure	107	60.5
Poor water system maintenance	95	53.7

Note: Multiple responses are possible

Source: Field survey, 2022

3.4.3.1 Urbanization

Regarding the causes of water supply shortages, 81.4% of respondents replied that urbanization in the study area was one of the causes. Similar to this finding, Li, Endter-Wada, and Li (2015) indicated that rapid population growth and urbanization are creating an additional demand for water infrastructure services. Providing water infrastructure, especially for the poor who are living outside the designated residential areas, like illegal settlements or slums, is a challenge.

3.4.3.2 Population Growth

According to the survey results, 57.6% of respondents indicated that population growth was also a cause for water supply shortages. In supporting this finding, Laschefski (2018) revealed that population growth and urbanization will create a severe of safe water supply across the worldTo meet the water demands of the future, communities will have to draw water from surface or deep ground sources that are located distance from the city. Furthermore, the fast growth of populated places is upsetting. To meet the water demands of the future, communities will have to draw water from surface or deep ground sources that are located distance from the city. Furthermore, the local hydrological cycle is disrupted by the rapid growth of built-up areas, which limits infiltration opportunities and causes rapid peak stormwater flows. Environmental pollution, declining sanitation, and massive water supply backlogs are major problems in developing country cities. In addition to increasing demand for water, a growing population will also reduce ecosystems' capacity to deliver cleaner, more consistent supplies. local hydrological cycle by generating high-peak stormwater flows and decreasing natural infiltration. Environmental pollution, declining sanitation, and massive water supply backlogs are major problems in developing country cities. In addition to increasing demand for water, a growing population will also reduce ecosystems' capacity to deliver cleaner, more consistent supplies.

3.4.3.3 Low Water Pressure

According to the analysis results in Table 13, 60.5% of respondents indicated that low water pressure is a cause of water supply shortages. As a result, the water force might occasionally be very low, preventing water from flowing up the system. This means that until the pressure increases and the water level rises, there won't be any water in the pipes or taps. This could take longer, particularly during the dry seasons, and

energy might be needed to pump water, leaving the system without water for a longer period.

3.4.3.4 Poor Water System Maintenance

As shown in Table 13, 53.7% of the sampled respondents indicated that poor water system maintenance causes water supply shortages in the study area. In line with this finding, Ngima (2015) stated that installing pumps and paying for electricity are expensive. The study also found that another factor contributing to the unpredictable water supply was decreased water levels at the sources. Due to improper management, conservation, and overexploitation, the water source points—such as wells and boreholes—have deteriorated, resulting in insufficient amounts of drinkable water.

4. Conclusion

The existing water supply did not satisfy the demand of the community in the study area. Loca Abaya Woreda's water supply could not meet the water demand of the population due to its existing capacity. In the study area, the population walks for more than 30 minutes. Currently, in Loca Abaya Woreda, the majority of dwellers have large family sizes. To meet these family needs, a sufficient amount of water is required. In the study area, family size, household income, and household distance to the water source significantly affect household water consumption. Because a higher number of family members in a household consumes a high amount of water, and households with high monthly incomes consume more water than those with low monthly incomes. However, households that travel a small distance consume more water than households far from the water source. In Loca Abaya Woreda, health-related problems included spending long hours collecting water, high water costs, poor sanitation, and conflicts, all of which posed challenges to the water supply.

5. Recommendations

Undoubtedly, understanding the problem and forwarding the following possible recommendations to the relevant bodies will help achieve an effective and efficient provision of a clean water supply in the study area. Therefore, the researcher forwards the following possible recommendations.

The communities in the study area walk far distances to fetch water. Therefore, both government and non-governmental organizations should work together to maintain existing water schemes and construct new ones, taking into account

the area's population density and national water supply standards.

The community in the study area had limited awareness of how to use water schemes properly. Therefore, the water committee, in collaboration with the Woreda water office, should place greater emphasis on community participation to foster community ownership, which is crucial to the sustainability of schemes.

The community in the study area was unable to manage, maintain, and document its resources appropriately. Therefore, the Woreda water office should provide proper training to maintain their schemes and manage their documentation of both financial and legal documents. This enables them to manage the scheme's income and make water schemes sustainable.

After the water supply is established, the amount of water is frequently prioritized over its quality. One of the health issues in the research area is the lack of chlorine treatment for drinking water at the source. Therefore, disinfecting source water and raising awareness about the use of chemicals for domestic water treatment should be the main priorities of the Woreda water and irrigation office and the health office.

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