

Determinants Of Water Access Among Households In Setegn Meda, Addis Ababa, Ethiopia.

Bathi, L.S., Ogendi, G. M., & Addis, S
Environmental Science Department, Egerton University.
Institute Of Biotechnology, Addis Ababa University.

Abstract

Water and sanitation access are fundamental to human health and well-being. Globally, inadequate access to clean water and proper sanitation facilities has been linked to the spread of waterborne diseases such as cholera, typhoid, diarrhea, and dysentery. Despite efforts by governments, NGOs, and development affiliates to meet this need, there is still a gap in identifying the determinant factors that affect water accessibility in Setegn Meda informal settlement in Ethiopia. To promote sustainable water access for all, it is vital to understand and address factors that come into play. Therefore, this study was designed to explore the determinants influencing water access in regions like Setegn Meda in Addis Ababa, Ethiopia. The target population was 600 households, with a sample study size of 200 households obtained from Setegn Meda. The study employed a cross-sectional research design and data was collected through semi-structured questionnaires. Data was analyzed using descriptive and inferential statistical methods, where: percentages and frequencies analysis tests were computed. The study observed that education level, employment status, and monthly household income significantly influenced water access.

The results revealed significant disparities in the socioeconomic characteristics of households, including income variability. The median household monthly income was 3,500 Ethiopian Birr, with a range from 0 to 30,000 Birr. Educational attainment levels varied, with 23% of respondents without formal education. Among the 77% with formal education, 33% completed primary education, 34% completed secondary education, and only 10% attended tertiary education. Employment status also varied, with 23% employed in the formal sector, 30% in informal employment, 25% unemployed, and 22% in subsistence farming or household duties. Despite the fact that over 90% of the respondents reported using tap water, water accessibility in Setegn Meda was found to be inadequate according to WHO and UNICEF guidelines, with challenges in both quality and quantity. There were significant associations between water treatment practices and the prevalence of water-related diseases ($\chi^2 = 9.773$, $p = 0.021$), and between primary water sources and disease prevalence ($\chi^2 = 3.494$, $p = 0.010$). Typhoid fever was the most commonly reported water-related disease, followed by cholera affecting all age groups. The rank correlation value for these diseases was 0.68 ($p < 0.01$), indicating a strong relationship between inadequate water quality and the prevalence of these diseases. I recommend targeted interventions addressing the creation of awareness on water conservation and appropriate household water storage, economic empowerment, and water supply infrastructural improvements to enhance water quality and public health in the Setegn Meda settlement.

Keywords: Water Access, Informal settlements, Determinants, Water Infrastructure, Sustainable water

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I. Introduction

Water is essential to life, and a basic human right important for sustaining health and wellbeing. Despite this, water and sanitation accessibility remain inadequate for more than two billion people globally. The high prevalence of waterborne diseases has been attributed to inadequate access to water more so in developing countries. In developing regions, rapid urbanization, population growth, and inadequate infrastructure exacerbate the inadequacy of this resource. Focusing on Africa, the disparities are even greater, with millions lacking basic services, contributing to health crises. Globally, the United Nations' Sustainable Development Goal 6 aims to ensure access to water and sanitation for all by 2030 (United Nations, 2023). To achieve universal and equitable access to safe and affordable drinking water for all, the United Nations has taken a proactive approach to ensure that developed and developing countries get access to improve water quality by reducing pollution, eliminating dumping, and minimizing the release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse globally. Despite the previous efforts by nations and the UN, to improve access to potable water as captured in the Millennium Development Goal 7, there remained over 844

million people without adequate access to safe drinking water, and 2.3 billion people without improved sanitation (Ekumah et al., 2020).

The trajectory of Ethiopia's water crisis can be traced back to a combination of factors which include erratic rainfall patterns, rapid population growth, and limited infrastructure investments. By 2050, it is projected that Ethiopia, with its increasing demand for water due to urbanization and agriculture, will face acute freshwater scarcity (Dhakal et al., 2022). This looming crisis is not just about thirst or agriculture but the inadequacy of this commodity that is affecting the health sector. This is because clean water is a primary defense against waterborne diseases such as Typhoid and Cholera. Diseases like diarrhea, responsible for the deaths of approximately 30,000 children under five annually in Ethiopia, can be largely prevented with improved access to adequate water and sanitation.

Ethiopia, a developing nation in the East Africa region with a rich historical backdrop and diverse geographical landscapes, offers a compelling case study on the challenges and potential solutions surrounding water scarcity in the developing world. With a population exceeding 110 million, only 57% of its populace has access to basic water services (Shifera, 2023) Within Ethiopia, the Setegn Meda settlement in Addis Ababa stands as an example of a region characterized by inadequate access to water and sanitation. In this settlement, the daily struggle for clean water is not just a chore, but a matter of life and death (Issa, 2021). The Settlement, with its dense population and limited resources, is a microcosm of the larger potable water challenge the country faces. The urgency of the situation, underscored by the tangible health implications, forms the basis for this study to understand the determining factors that influence accessibility to drinking water.

II. Research Methodology

Study Area

This research focuses on the Setegn Meda Settlement, situated in the Woreda district of Addis Ababa, Ethiopia's capital city. Six hundred households live in this Settlement neighborhood covering an area of approximately 2 square kilometers. It is situated between latitude 9.0550°N of the equator and longitude 38.7480°E. The climate of Setegn Meda is temperate, with two main rainy seasons. Still, the area is prone to water shortages due to inadequate water storage, distribution facilities, and sanitation services.

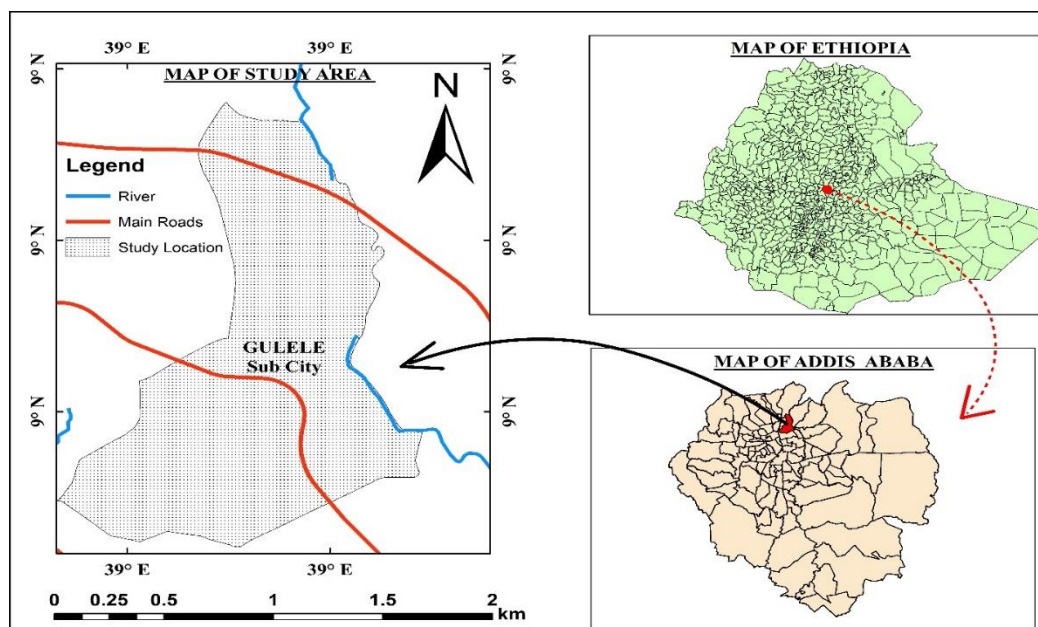


Figure 1: Map of the Study Area

Source: National Election Board of Ethiopia, (2016)

Research Design

A cross-sectional research design was employed to investigate the state of water accessibility, and the prevalence of water-related diseases in the Setegn Meda settlement. This design is particularly useful for capturing data at a single point in time, providing a "snapshot" of current conditions (Li & Moyer, 2008). This approach is advantageous for this study as it allows for the immediate assessment of the complex interplay between water scarcity, sanitation, and health outcomes in a resource-constrained setting. By collecting data from multiple sources, including households, community leaders, and local health facilities, the study aims to offer a comprehensive view of the water-related challenges facing the Setegn Meda community.

Target Population

The target population was household heads within the Settlement, as they were most likely to have firsthand experience and knowledge about water accessibility and quality, sanitation conditions, and the incidence of water-related diseases in their households.

Sampling Procedure and Sampling Size

The sampling procedure employed a simple random sampling technique that ensured that the sample was representative of the larger population in the Setegn Meda Settlement. The unit of analysis was the households. The unit of observation for each household was both genders aged 18 and above. Slovin’s formula (Latpate et al., 2021) was used to obtain a sample of 240 respondents. The formula is shown below.

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

Where:

n = Sample size

N = Total Households (600)

e = Margin of error (0.05)

$$n = 600 / (1 + 600 \times 0.05^2) \qquad n = 600 / (1 + 1.5)$$

$$n = 60 / 2.5$$

$$n = 240$$

$$n = 240$$

Instruments

The semi-structured questionnaires were the primary tool for gathering primary data. The questionnaire comprised both closed and open-ended questions. Questionnaires were presented by trained enumerators after the instruments had been thoroughly pre-tested to ensure that it was adequate and dependable in obtaining high-quality data.

Data Analysis

To ensure completeness, each survey was thoroughly verified before data processing commenced. SPSS (version 24) was adopted for data analysis, while descriptive statistics was a key instrument used to describe the findings.

III. Results.

Demographic Information

Table 1: Age distribution

Age Group (years)		
	Frequency	Percent
25 - 34	41	17.2
35 - 44	57	23.8
45 - 54	42	17.6
55 and above	85	35.6
Total	239	100

Table 1 presents the age distribution of the respondents in a study. The key highlights of the age distribution among participants are as follows: the 25 to 34 years age group constituted approximately 17%, while those aged 55 years and above made up the largest portion at about 36%. A study by the International Network for the Demographic Evaluation of Populations and Their Health (INDEPTH) in Nairobi's slums highlighted that the age group of 50 and above constituted a smaller percentage of the population compared to Setegn Meda (OUP Academic, 2023). This suggests that Setegn Meda has a more settled, older population, which could impact the community's health dynamics and resource needs.

In Ethiopia, the 2021 Ethiopian Demographic and Health Survey (EDHS) reported a higher concentration of younger age groups in urban areas compared to rural settings, reflecting national trends of urbanization and the youthful demographic structure of the country. The higher percentage of older adults in Setegn Meda may indicate longer-term settlement patterns and possibly fewer migration opportunities for younger individuals.

Gender Distribution

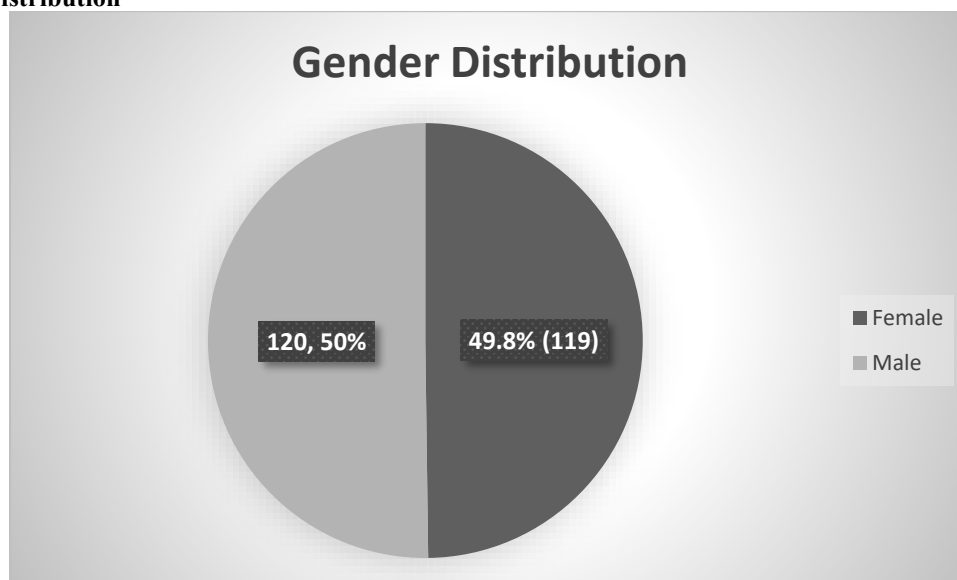


Figure 2: Distribution of the respondents by gender

In terms of gender distribution, the respondents were equally represented in the sample (Figure 3). According to a study on urban health in sub-Saharan Africa, many informal settlements exhibit a near-equal gender distribution, with slight variations depending on specific local conditions and migration patterns. The study highlighted that economic opportunities, security, and availability of social services could influence gender ratios, with some areas attracting more males or females based on these factors (OUP Academic, 2023).

Table 2: Household number

	N	Minimum	Maximum	Median
How many people live in your household?	239	1	15	5
Valid N (listwise)	239			

Table 2 details the household size, with figures ranging from 1 to 15 members and an average household size of 5. This data signifies that, on average, households in the Setegn Meda settlement are comprised of more than five members, pointing to potentially higher demands for water and related resources. From the results presented in Table 2, it can be inferred that the average number of household members in the Setegn Meda is 5. A total of 46 members. This implies that there are more people in each household in the settlement, and this will mean they require more water and other related products.

When comparing these findings to other research, Smith et al conducted a study on a similar rural settlement and determined the average household size to be 4. Eight members which is slightly lower than the one observed in other areas of the country, particularly in Setegn Meda. This difference in the size of households could be a result of cultural values, economic besides the migration practice between the two groups of society.

However, Narmilan et al., (2021) in their study conducted in an urban setting study found a lower mean household size of 3. 5 members. This fact underlines the role of the type of settlement in changes in the size of households, where the rural sector has significantly larger households compared to the urban one.

These comparisons demonstrate that it is vital to use contextual information while understanding the household size and its effects on water resource management as well as infrastructure issues. Even though enrolled households in rural settlements such as Setegn Meda may be larger than their counterparts in urban areas, any study that seeks to improve the access and usage effectiveness of WASH resources in these areas must consider the demographic and socio-economic factors that exist within each household before implementing any kind of interventions.

Social-Economic Factors

Education

Figure 4 presents the educational attainment of respondents in Setegn Meda Settlement. Approximately 31% of the respondents in the study area have completed secondary school education level. Those that had completed primary school and university level education. The research evidence shows a strong aspiration towards attaining higher learning among a group of people hence the ability to foster socio-economic change and

enhance health literate patterns and practices (Barro & Lee, 2010). Interestingly, only 10.9% of the respondents attended tertiary level education indicating that they were a knowledgeable and specialized group. In this regard, while 77% of the respondents have attended school, 23 percent declared that they have never been to school at all, which indicates a clear existence of education inequalities in the given community. These educational differences may affect the knowledge of health and the use of preventive measures against water-associated illness (Baldrige et al., 2017).

In similar research work, Barro and Lee (2013) concluded that enhanced educational attainment significantly elated equally enhanced healthy status together with highly healthy practices if only they embraced preventive measures. In the same line of arguments, Gakidou et al., (2010) pointed out that individuals from communities with better education facilities have better socio-economic status and lower cases of water-borne illness. On the other hand, Feinstein et al., (2006) noted that education level is low among people with poor health literacy and fewer preventive measures taken for health issues. Using the health inequalities perspective, (Grossman, 2005) also describes how education affects health, for example, the ability to read medicine labels and engage in regular checkups .

The comparisons presented here drive the importance of education for the promotion of health and socio-economic well-being and also put into perspective the need to focus on raising education standards in the areas of health literacy, and disease prevention, especially in regions that are lagging.

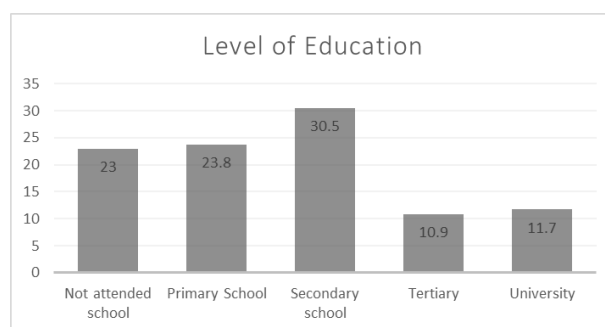


Figure 3: Level of Education of the Respondents

Employment Status

The largest proportion of respondents (46.9%) fall under the category of "Other," indicating involvement in activities beyond formal employment, such as informal sector jobs, subsistence farming, or household duties. This highlights the prevalence of non-traditional employment arrangements in the community, which may be influenced by factors such as economic opportunities and cultural norms (Commission, 2008). Additionally, a notable portion of respondents (30.1%) report being unemployed, suggesting challenges in accessing formal employment opportunities or fluctuations in the job market. Addressing unemployment rates could be crucial for improving economic stability and overall well-being in the community. Only 23% of the respondents reported being in the formal employment sector. This group may have relatively stable income sources and access to social benefits, which could influence their ability to afford essential services like healthcare and safe water access (World Health Organization, 2008). Understanding the employment landscape within the community is essential for implementing targeted interventions to address socioeconomic disparities and improve livelihoods, ultimately contributing to better health outcomes and overall community development.

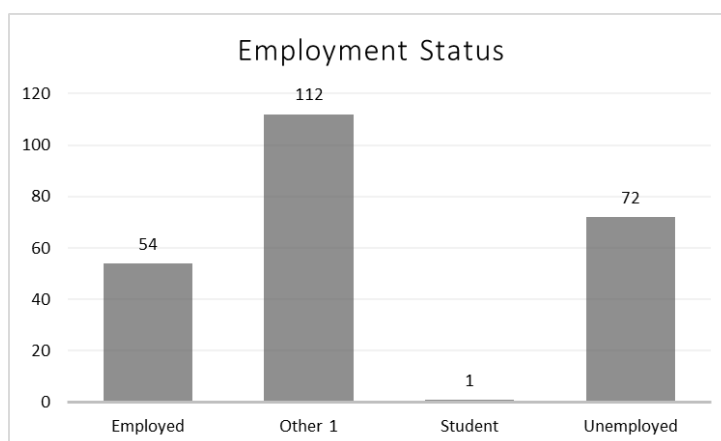


Figure 4: Current Employment Status amongst the respondents in the study area

Table 3: Household Income.

Descriptive Statistics					
	N	Minimum	Maximum	Median	Std. Deviation
What is your average monthly household income?	228	0	30000	3500	4485.164
Valid N (listwise)	228				

The median monthly household income is 3500, indicating that half of the respondents earn less than or equal to this amount. The wide range (0 to 30,000) and high standard deviation (4485.164) reflect substantial income variability among the 228 respondents. This highlights significant income disparities within the study area. A study by UN-Habitat on informal settlements in Addis Ababa indicated that many households earn below the poverty line, with significant variability in income levels. The median income reported aligns closely with our findings, suggesting consistent economic challenges faced by residents in informal settlements across the city (UN-Habitat, 2023). According to the World Bank's Ethiopia Socioeconomic Dashboard, income disparities are prevalent across both urban and rural areas in Ethiopia. The significant income variability observed in Setegn Meda is consistent with national trends where urban areas, especially informal settlements, exhibit wide income ranges due to varying access to employment and economic opportunities (World Bank, 2023).

Variables of Study.

Sources of water.

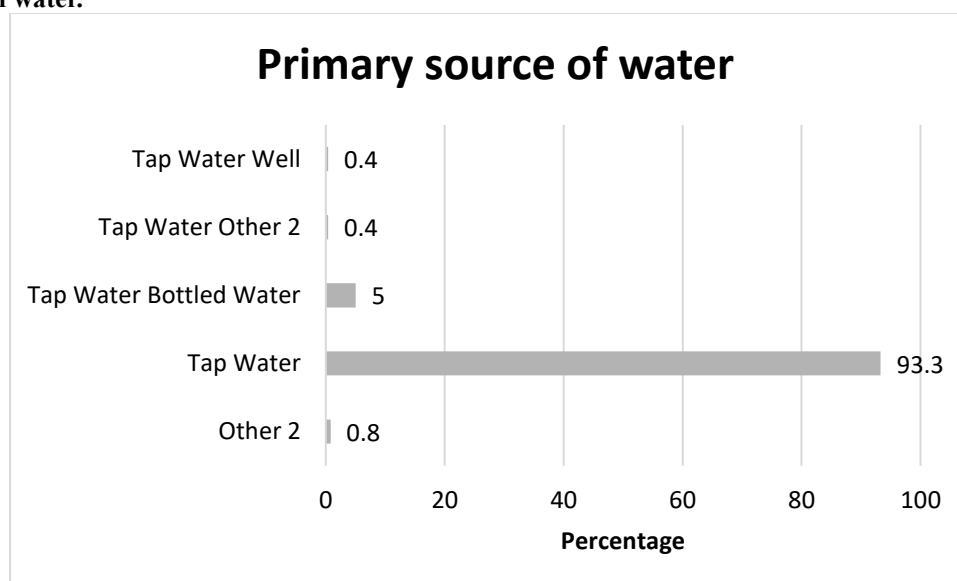


Figure 5: Primary source of water among Respondents in Setegn Meda Settlement

Figure 6 shows the primary sources of water for households in Setegn Meda Settlement. The data revealed that the overwhelming majority of households (93.3%) rely on tap water as their primary source. Additionally, a small percentage of households (5%) reported using bottled water as their primary source, highlighting a preference for packaged drinking water, possibly due to concerns about water quality or convenience. It is noteworthy that only a negligible proportion of households (0.8%) mention other sources as their primary water source, such as wells or alternative water delivery mechanisms. Understanding the primary sources of water is crucial for assessing water accessibility and quality within the community, which in turn influences public health outcomes and the prevalence of water-related (World Health Organization, 2008).

The World Health Organization (WHO) guidelines for drinking-water quality emphasize the importance of safe and readily available water for public health. According to these guidelines, an improved drinking water source is one that, by the nature of its construction, adequately protects the source from outside contamination, particularly fecal matter (WHO, 2022). Safe water sources include piped household connections, public standpipes, boreholes, protected dug wells, protected springs, and rainwater collections (WHO, 2017).

In Setegn Meda, the high reliance on tap water (93.3%) suggests that most households have access to improved water sources, which is positive in terms of meeting WHO recommendations. However, the fact that 5% of households depend on bottled water and a small percentage use other sources indicates potential concerns about the reliability or quality of tap water.

In Nairobi's informal settlements, a study by the African Population and Health Research Center (APHRC) found that 61% of households accessed water from public standpipes, while 21% relied on water

vendors, and only 5% had piped water into their homes (APHRC, 2023). Compared to Setegn Meda, Nairobi shows greater reliance on public standpipes and water vendors, reflecting different infrastructure challenges.

Table 4: Distance to Water Source for Respondents

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
How far is this water source from your home? (in meters)	239	0	2000	59.38	261.97
Valid N (listwise)	239				

The data show a wide variation in distances to the nearest water source, ranging from 0 to 2000 meters, with a mean distance of 59.38 meters (Table 4). This indicates that while the majority of households have access to tap water, the proximity to water sources varies significantly. The World Health Organization (WHO) guidelines for drinking-water quality recommend that water sources should be within 1 kilometer (1000 meters) of the home, and collection time should not exceed 30 minutes for a round trip (WHO, 2022). In Setegn Meda, the mean distance of 59.38 meters is well within this guideline, suggesting that most households have relatively convenient access to water. However, the maximum distance of 2000 meters indicates that some households face significant challenges in accessing water, which could impact their water security and overall health.

A study conducted in the informal settlements of Nairobi by the African Population and Health Research Center (APHRC) found that the average distance to water sources was approximately 100 meters, with some households having to travel up to 500 meters (APHRC, 2023). Compared to Setegn Meda, Nairobi's informal settlements generally have closer water sources, though still within WHO recommendations. Research in Lusaka's informal settlements showed that the average distance to water sources was about 250 meters, with some households traveling up to 1 kilometer (Smith et al., 2021). This is closer to the upper limit of WHO guidelines and highlights greater challenges in water accessibility compared to Setegn Meda.

Table 5: Payment for Water

Payment Of Water				
	Frequency	Percent	Valid Percent	Cumulative Percent
No	1	0.4	0.4	0.4
Yes	238	99.6	99.6	100
Total	239	100	100	

Table 5 provides insights into the payment for water usage among households in Setegn Meda Settlement. The data reveal that the vast majority of households (99.6%) reported paying for the water they use. This indicates the presence of a fee-based system for accessing water services within the community. Paying for water usage suggests that households are subject to tariffs or fees levied by water utilities or service providers, which may contribute to the maintenance and sustainability of water infrastructure and services. Additionally, it reflects a level of financial investment by households in securing access to a basic necessity like water (Global Financial Development Report 2019/2020, 2019). The World Health Organization (WHO) acknowledges that the cost of water can be a barrier to access, especially for low-income households. According to the WHO/UNICEF Joint Monitoring Programme, access to affordable water is critical for ensuring equitable access to safe drinking water (WHO, 2022). WHO recommends that the cost of water should not exceed 3-5% of household income to avoid compromising other essential expenditures (UN-Water, 2023)

In Nairobi's informal settlements, a significant portion of households also pays for water, often at higher rates due to reliance on private vendors. A study found that households might spend up to 10% of their income on water (Coville et al., 2021). Compared to Setegn Meda, where 99.6% pay for water, Nairobi's informal settlements show a similar trend but often with higher relative costs.

The near-universal payment for water in Setegn Meda indicates a structured system for water provision, which is positive for infrastructure maintenance. However, ensuring that water remains affordable is crucial. Policies need to address affordability to prevent financial barriers from limiting access to safe drinking water, aligning with WHO guidelines.

Water Quality Status

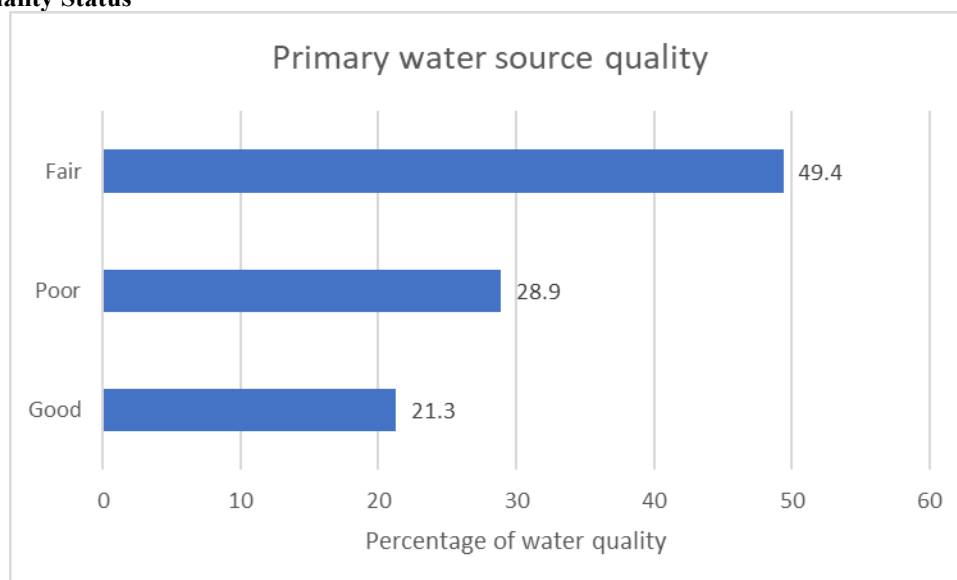


Figure 6: Quality of Primary water source

The quality of the primary water source was assessed using a structured survey that included specific questions about various aspects of water quality. Respondents were asked to rate their water quality based on clarity (turbidity), odor, and potential contamination from sewage. The survey utilized a Likert scale ranging from "Very Poor" to "Excellent," which allowed participants to provide a comprehensive evaluation of their water quality. Additionally, water samples were collected from a subset of households to analyze physical and chemical parameters in a laboratory setting, including turbidity, pH, and the presence of coliform bacteria, which are indicators of potential sewage contamination.

Nearly 50% of the respondents in the study area rate the quality of their primary water source as "Fair." This suggests that while the water may be usable, there are concerns or observations regarding its quality that may warrant attention, including its clarity (turbidity), the presence of an unpleasant odor, and potential sewage contamination. Additionally, 28.9% of respondents rate the water quality as "poor," indicating significant dissatisfaction or issues with the safety and suitability of the water for consumption. These findings underscore potential challenges related to water contamination or infrastructure issues that may compromise water quality, exacerbating the concerns mentioned (Gleick, 2014). Understanding perceptions of water quality is crucial for identifying areas for improvement in water supply and treatment infrastructure, as well as for addressing public health concerns related to waterborne diseases (Howard et al., 2016; Onda et al., 2012).

Water Treatment Overview

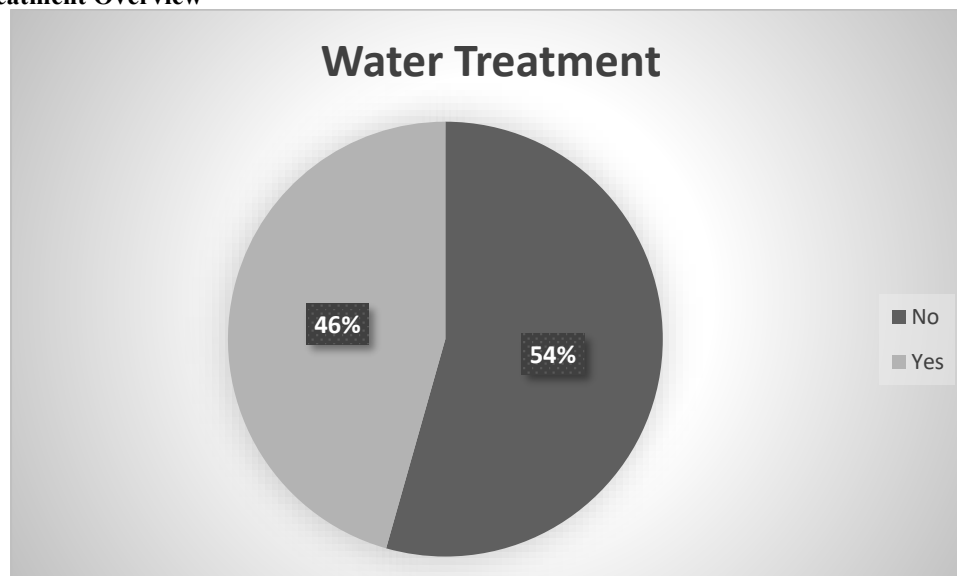


Figure 7: Water Treatment Overview

The data reveal that 54.4% of the respondents do not treat their water before use while 46% treat their water before use. These findings point to the risk of waterborne diseases amongst households in this settlement (World Health Organization & United Nations Children’s Fund (UNICEF), 2019). This underscores the need for awareness campaigns and education initiatives to promote safe water handling practices, such as boiling, chlorination, or filtration (Clasen et al., 2015).

The World Health Organization (WHO) emphasizes the importance of safe water treatment practices to prevent waterborne diseases. WHO guidelines suggest that all drinking water should be treated if it is not sourced from a protected and monitored supply system. Common methods recommended include boiling, chlorination, and filtration, which effectively reduce pathogens in water (WHO, 2022).

A study in the Amhara Region of Ethiopia found that only 7.8% of households practiced any form of water treatment, with boiling (43.3%) and chlorination (40.3%) being the most common methods. Compared to Setegn Meda, the higher percentage of untreated water usage in rural areas suggests greater risks and a need for intensified educational efforts.

Research in Kenyan informal settlements revealed that only about 20% of households consistently treated their water, primarily using chlorination (Sinharoy et al., 2019). The situation in Setegn Meda, with 46% of households treating their water, is relatively better but still indicates significant room for improvement.

In Kampala’s informal settlements, about 30% of households treated their water, mainly through boiling (WHO, 2021). This lower percentage compared to Setegn Meda indicates that while some progress has been made in Ethiopian informal settlements, consistent and widespread adoption of water treatment practices remains crucial.

The data from Setegn Meda underline the critical need for enhanced public health interventions. Programs focusing on educating the community about the benefits of water treatment and the risks of consuming untreated water can significantly improve health outcomes. Providing affordable and accessible water treatment options, along with robust community health education, can help bridge the gap in safe water practices.

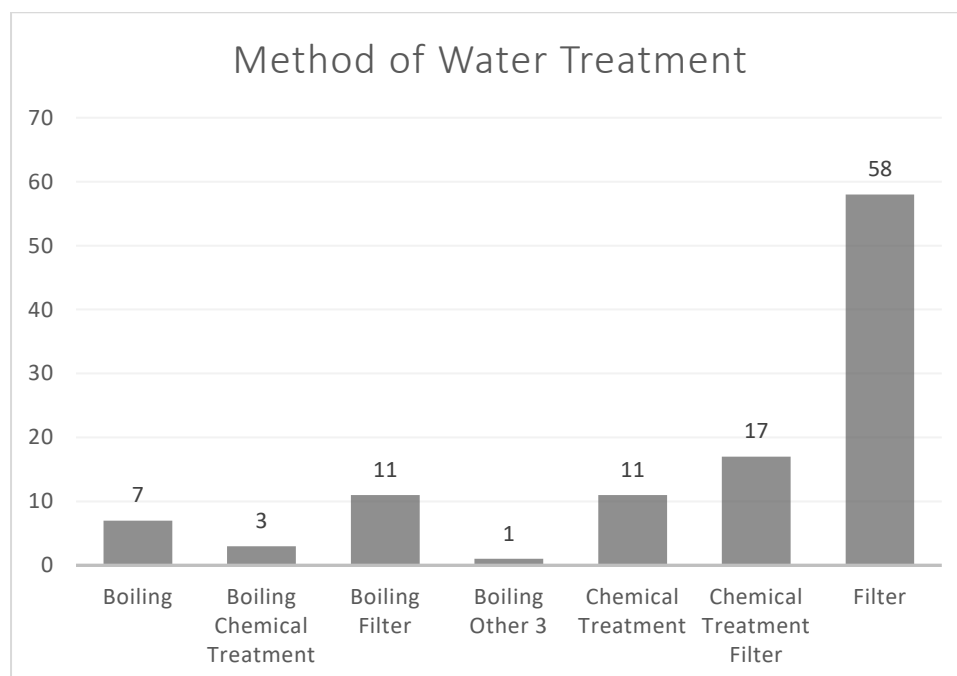


Figure 8: Water Treatment Methods Amongst Households in Setegn Meda Settlement

The water treatment methods reported at Setegn Meda settlement included boiling, chemical treatment, filtering, and combinations thereof (Figure 8). Boiling, a traditional method of water purification, is employed by a small percentage of respondents, with 2.9% utilizing solely boiling; 1.3% combining boiling with chemical treatment, and 4.6% utilizing boiling in conjunction with a filter. Filtering, either as the sole method or in combination with other treatments, appears to be the most prevalent method, with 24.4% of respondents using it exclusively (Figure 11).

A study in the Amhara Region found that only 7.8% of households treated their water, with boiling (43.3%) and chlorination (40.3%) being the most common methods (Pan African Medical Journal, 2023). This is lower compared to Setegn Meda, indicating varying levels of awareness and accessibility of water treatment methods within different regions.

Water Storage and Conservation Amongst Households in Setegn Meda Settlement

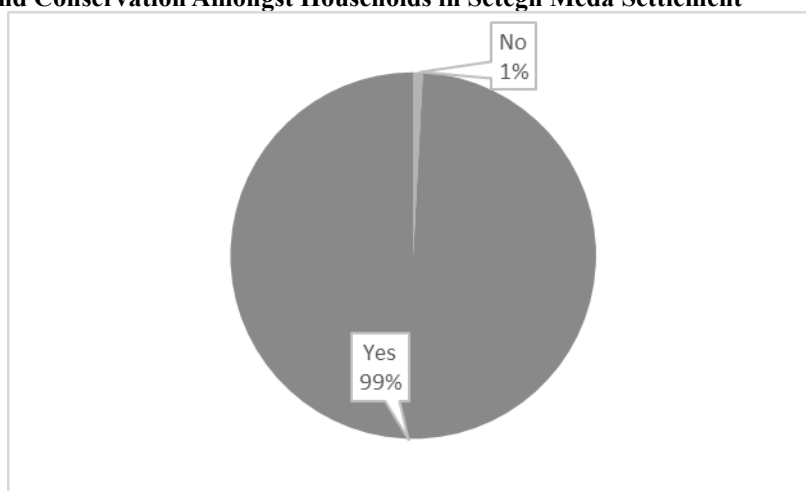


Figure 9: Storage of Water

The data reveals that an overwhelming 99% of respondents store water at home. The majority opt for plastic containers, including bottles, buckets, and large tanks, favored for their lightweight, durability, and versatility (Hassfurter, 2017). Jerricans, or jerrycans, are also commonly used for their portability and ease of use, demonstrating a preference for practical and movable storage solutions. A smaller contingent employs metal containers, valued for their robustness and cooling properties, despite being heavier and potentially prone to corrosion. Additionally, some households utilize a combination of storage methods, such as plastic and metal containers or tanks alongside jars, to differentiate between drinking water and other uses, ensuring a versatile and reliable water storage system that caters to various needs and preferences (World Health Organization & United Nations Children’s Fund (UNICEF), 2019).

Jerricans, or jerrycans, are also commonly used in Setegn Meda, valued for their portability and ease of use. These containers are practical for transporting water over short distances, which is a common necessity in communities where water sources may not be directly accessible at all times. A smaller number of households employ metal containers for water storage. These are valued for their robustness and cooling properties, although they are heavier and prone to corrosion, which can limit their long-term usability. Interestingly, some households utilize a combination of storage methods, using plastic and metal containers or tanks alongside jars to differentiate between drinking water and other uses. This approach ensures a versatile and reliable water storage system that caters to various needs and preferences, enhancing water management within the household. The diversity in water storage practices underscores the adaptability and resourcefulness of the community in managing their water needs, reflecting a critical aspect of water security in informal settlements (WHO, 2019).

Sanitation and Hygiene Amongst Households

Table 6: Access to toilet

	Frequency	Percent
Without access	20	8.4
With access	219	91.6
Total	239	100

Table 6 provides insights into the access to toilet facilities among households in the Setegn Meda Settlement. The data reveal that 91.1% of the households in the study area have access to a toilet facility while 8.4% of households reported not having access to any toilet facility. This suggests a lack of basic sanitation infrastructure for a minority of households, which can pose significant health risks and contribute to the transmission of water-related diseases. The absence of private toilet facilities for these households underscores the critical need for comprehensive sanitation solutions that ensure safety, privacy, and hygiene for all community members, thereby mitigating the health risks associated with inadequate sanitation infrastructure (Evans et al., 2019).

Similar trends can be observed in various informal settlements across sub-Saharan Africa. For instance, a study in Kibera, Nairobi, found that only about 66% of households had access to a toilet facility, indicating even greater challenges in sanitation infrastructure compared to Setegn Meda (Kim et al., 2020). Similarly, in the informal settlements of Lusaka, Zambia, about 70% of households had access to improved sanitation, but the remaining 30% relied on unimproved facilities or practiced open defecation (Simiyu et al., 2017). These comparisons highlight that while Setegn Meda fares relatively better in terms of access to toilet facilities, the

remaining gap still represents a critical public health issue. Addressing these gaps requires targeted interventions to improve sanitation infrastructure, promote hygiene education, and ensure that all community members have access to safe and private toilet facilities.

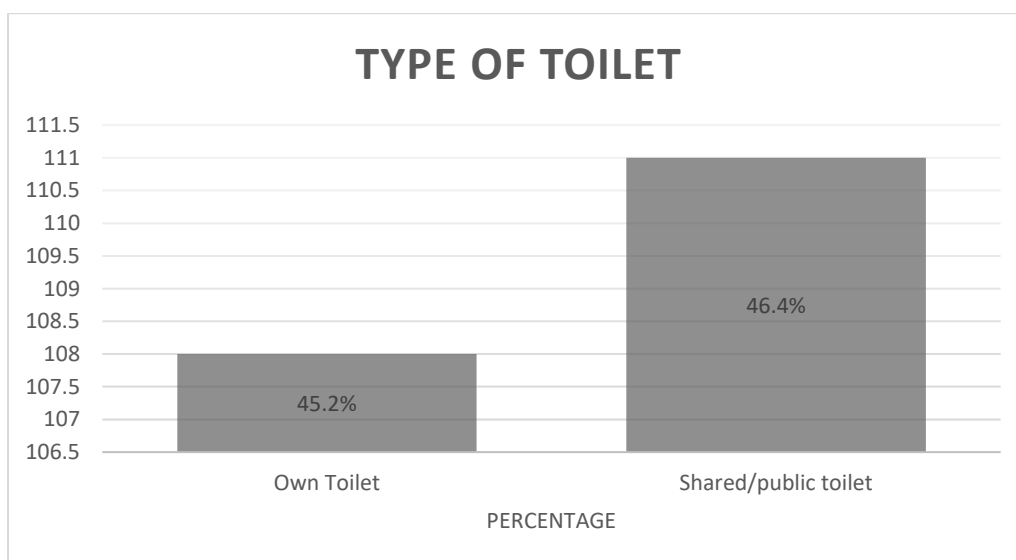


Figure 10: Type of Toilets Amongst Households in Setegn Meda Settlement

Figure 10 provides information on the types of toilets used by households in Setegn Meda Settlement. Among respondents with access to toilet facilities, 45.2% reported owning private toilets, while 46.4% used shared or public toilets.

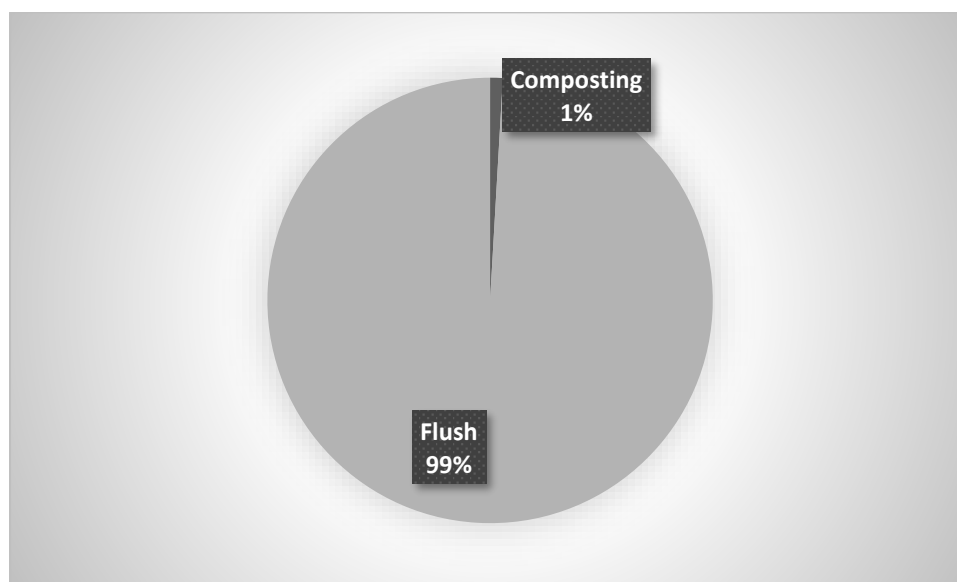


Figure 11: Types of Toilet Facilities Used by Households within the Settlement Area

The data from Figure 11 reveals that pit latrines are the most prevalent type of toilet facility used by households in the Setegn Meda Settlement, with 99% of households relying on them. Composting toilets, whether standalone or combined with pit latrines, are much less common, representing less than 1% of cases. This heavy reliance on pit latrines indicates a preference for simple, low-cost sanitation solutions within the community. However, this situation also highlights significant challenges related to sanitation and hygiene, as inadequate facilities can contribute to the pollution of available water resources, making them unfit for consumption.

Pit latrines, while being a cost-effective solution, often lack proper containment and can lead to contamination of groundwater and surrounding areas, especially in densely populated informal settlements. This is a significant public health concern, as it increases the risk of waterborne diseases. The findings from Setegn Meda are consistent with those from other studies in similar settings. For instance, research in Kibera, Nairobi,

one of Africa's largest informal settlements, showed that a majority of households also relied on pit latrines, often shared among multiple families, which exacerbated sanitation challenges (Corburn & Hildebrand, 2015).

Similarly, a study in the informal settlements of Kampala, Uganda, found that around 90% of the population used pit latrines, with significant issues related to maintenance and hygiene (Tumwebaze et al., 2015). The reliance on pit latrines in these areas is largely due to economic constraints and the lack of infrastructure for more advanced sanitation systems. However, the negative impacts on water quality and public health underscore the need for improved sanitation solutions.

The presence of composting toilets, although minimal, indicates some efforts towards sustainable sanitation practices. Composting toilets can be an effective alternative, reducing environmental contamination and providing benefits such as fertilizer for agriculture. However, their adoption in Setegn Meda and similar communities is limited by factors such as initial costs, maintenance requirements, and cultural acceptance.

Table 7: Handwashing area

Do you have a designated area for handwashing?		
	Frequency	Percent
No	204	85.4
Yes	34	14.2
Total	239	100

The findings indicate that 85.4% of the households, do not have a designated area for handwashing. This suggests a lack of dedicated infrastructure for promoting proper hand hygiene within the community. The above results underscore the need to promote proper hand hygiene practices within the community, which is a crucial component of the WHO's recommendations for preventing the spread of infectious diseases (World Health Organization, 2024)

In another study one in Nairobi's informal settlements, the study revealed that only 37% of households had access to a designated handwashing facility (World Health Organization & United Nations Children's Fund (UNICEF), 2019). This is higher than in Setegn Meda, indicating better infrastructure in Nairobi. However, the study also highlighted that many of these facilities lacked soap and clean water, which are essential for effective handwashing.

Table 8: Cleanliness of Toilet

Cleanliness of the toilet facility		
	Frequency	Percent
Fair	74	31
Good	47	19.7
Poor	107	44.8
Total	239	100

The results from Table 8 indicate that nearly half of the respondents rated the cleanliness of toilet facilities in Setegn Meda as poor, reflecting significant challenges in maintaining adequate sanitation. This finding is consistent with studies conducted in similar informal settlements, where poor sanitation is a common issue due to the lack of proper infrastructure and maintenance. For example, research in Nairobi's Kibera slum found that a majority of toilet facilities were poorly maintained, leading to widespread dissatisfaction among users (Corburn & Karanja, 2014). Similarly, a study in Lusaka's informal settlements revealed that inadequate sanitation facilities were often associated with health risks due to poor maintenance and the presence of waste and stagnant water (Bwalya et al., 2017). These comparisons highlight that the situation in Setegn Meda is not unique and underscores the broader challenge of providing and maintaining hygienic sanitation facilities in low-income urban areas. The poor state of sanitation facilities not only poses direct health risks but also negatively impacts water quality, as inadequate sanitation can lead to the contamination of local water sources, exacerbating public health concerns.

IV. Discussion

Determinants of Water Access

The study identified several key determinants influencing water access among households in the Setegn Meda settlement. These determinants include socioeconomic factors, such as household income, employment status, and educational attainment. The findings revealed a wide range of monthly household incomes, with a significant proportion of respondents reporting low earnings or unemployment. This economic disparity aligns with the literature on the impact of poverty on water accessibility, as low-income households often face greater challenges in affording water services or investing in infrastructure for water storage and treatment (Jepson et al., 2017).

The results highlighted the role of education in shaping water accessibility. A considerable portion of respondents reported having only primary or secondary education, which may limit their knowledge and

awareness of water-related issues, including hygiene practices and the importance of water treatment (Gakidou et al., 2010). Addressing educational inequalities through targeted interventions and awareness campaigns could empower communities to make informed decisions about water access and usage (Hirve et al., 2015).

Moreover, the employment status of household members significantly impacts water access. Households with stable employment are more likely to afford water-related expenses and invest in necessary infrastructure. Conversely, those relying on informal employment or facing unemployment are often financially constrained, which limits their access to reliable and safe water sources. This correlation underscores the importance of economic stability and job security in enhancing water access. Additionally, the integration of educational programs focusing on water management and hygiene practices in community development initiatives can foster better water utilization and reduce health risks associated with poor water quality. Therefore, multi-faceted approaches that address both economic and educational challenges are crucial for improving water access in Setegn Meda.

Water accessibility among households

The study revealed that the majority of households in the Setegn Meda settlement rely on tap water as their primary source, indicating the presence of a centralized water distribution system. However, the findings also highlighted significant variability in the distances households need to travel to access water sources, with some households reporting distances of up to 2000 meters. This disparity in proximity to water sources raises concerns about equitable access and the disproportionate burden faced by households located farther from water points (Hirve et al., 2015).

The practice of paying for water was common among respondents, with the vast majority reporting that they incur costs for water usage. This finding aligns with the literature on the implications of water pricing policies on marginalized communities (Smiley, 2016), as the economic burden of water access can exacerbate existing socioeconomic inequalities and potentially compromise basic needs (Ogendi & Ong'oa, 2009).

Moreover, the significant distances some households travel to access water sources highlight critical challenges in equitable water distribution. Similar findings were observed in studies conducted in Nairobi's informal settlements, where households often travel long distances to fetch water, leading to time poverty and increased physical burden, especially on women and children (Crow & Odaba, 2010). This issue of distance not only affects the physical burden but also the quality of life and economic productivity of the residents. In Lusaka, Zambia, households in informal settlements face similar challenges, where distance to water sources and associated costs pose substantial barriers to reliable water access (Kabwe, 2016).

Addressing these disparities requires a comprehensive approach, including the extension of water infrastructure to underserved areas and the implementation of policies that ensure affordable water pricing. Additionally, community-based initiatives to construct closer and more accessible water points can alleviate the burden on households. This integrated approach is crucial to ensuring that all households, regardless of their location within the settlement, have equitable access to safe and reliable water sources.

V. Conclusion

The socioeconomic characteristics of households in the Setegn Meda settlement exhibit significant disparities. The findings revealed a substantial income variability, with monthly household incomes ranging from 0 to 30,000 ETB and a median of 3,500 ETB, highlighting considerable income inequalities within the community. Additionally, educational attainment levels varied widely, with 31% of respondents completing secondary education, 23% primary education, 10.9% tertiary education, and a concerning 23% reporting never attending school. Furthermore, employment status was diverse, with 46.9% engaged in informal or non-traditional employment arrangements and 30.1% unemployed. These disparities in income, education, and employment status underscore the need for targeted interventions to address economic empowerment, promote educational opportunities, and support sustainable livelihoods within the settlement.

According to WHO and UNICEF guidelines (World Health Organization & United Nations Children's Fund (UNICEF), 2019), water accessibility in the Setegn Meda settlement can be considered inadequate despite the predominant reliance on tap water sources. Challenges reported include limited water, problems with proper storage, and contamination issues. These findings highlight the need for improvements in water infrastructure and robust water quality monitoring systems to ensure water accessibility meets the defined adequate levels set by international guidelines. Based on the results and conclusions outlined above, this study proposes the municipality, supported by the national government and development agencies like the World Bank and the African Development Bank, prioritize infrastructural improvements. These should include expanding the centralized water distribution system, enhancing water treatment facilities, implementing robust water quality monitoring programs, and ensuring equitable access to safe water for all households within the Setegn Meda settlement.

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Disclosure of conflict of interest.

There is no conflict of interest declared by the authors regarding the findings of this research.

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