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RESEARCH ARTICLE

Knowledge and awareness about water sanitation and hygiene practice among the selected urban area in Somalia

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ABSTRACT

The global issue of inadequate access to water supply affects more than 850 million people, while over 2.5 billion individuals face limitations in accessing sanitation facilities (WHO and UNICEF, 2014). Recognizing the importance sufficient sterilizations, clearness and safe water Improved sanitation reduces health system costs and leads to fewer days lost at work or school, decreased queue times at shared sanitation facilities, and the elimination of open defecation. This study used by cross- sectional study this means the sample was selected from the target group, and information was obtained simultaneously at a particular point in time. The study result concluded that majority 86 (68.4%) of the respondents were male. The highest number of the respondents 94(75.2%) were aged 20– 25 years.The majority 60(48%) of the respondents were single. The majority 117 (93.6%) of the respondents were university level of Education. According to the business respondents, the majority of the respondent's 51 (40.8%) student. 108 respondents (86.4%) have the perceived level of knowledge to consider as appropriate for using Aqua Tap, while 17 respondents (13.6%) do not. Aqua Tap is one of the technologies in water treatment, and given that respondents need to choose from various technologies, high knowledge of Aqua Tap indicates good availability and awareness of this particular technology. Highest number of the respondents 104 (86%) said yes there is serious problems that can cause poor watersanitation.

The specialists dove into and underscored angles, for example, research configuration, target populace, test size, inspecting procedures, research instruments, information assortment, information examination, legitimacy and dependability, moral contemplations, and test outline. This study was a cross-sectional review. This implies that the example was chosen from the objective gathering, and data was gotten all the while at a specific moment.

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1. Introduction

Access to clean water, adequate sanitation, and proper hygiene—collectively referred to as WASH—are fundamental human rights and essential components of public health and human development. Despite decades of global initiatives and substantial investments, a significant portion of the global population continues to live without reliable access to these basic services. Over 850 million people lack access to safe drinking water, while more than 2.5 billion individuals are without improved sanitation facilities. These deficiencies not only lead to the spread of preventable diseases but also impose heavy economic and social burdens on already vulnerable communities[1].

Poor sanitation remains a major issue in many developing countries, particularly in sub-Saharan Africa, where an estimated 215 million people still practice open defecation. This practice contributes to widespread environmental contamination and the transmission of waterborne diseases[2]. In these regions, inadequate hygiene, unsafe water sources, and lack of sanitation infrastructure are directly linked to nearly half of all cases of child and maternal undernutrition and mortality. Children are disproportionately affected, often suffering from recurrent illnesses such as diarrhoea, intestinal worm infections, and malnutrition—conditions that are closely connected to WASH-related factors[3].

Urban environments, particularly in rapidly growing low-income areas, face acute challenges in maintaining WASH services. For example, cities like Chitungwiza have experienced significant declines in water and sanitation service delivery due to aging infrastructure, water rationing, waste mismanagement, and overcrowding. While improvements in water quality can have a modest impact on health outcomes, research shows that increased water availability—enabling better hygiene practices—has a more profound effect. Education campaigns focusing on handwashing, safe waste disposal, and the protection of drinking water sources are crucial for sustainable improvements in public health[4].

The absence of adequate WASH facilities also affects the education sector. Millions of children miss school each year due to illnesses related to poor water and sanitation, and many schools lack the infrastructure needed to support student hygiene. This situation has a particularly detrimental effect on girls, who often face additional barriers to school attendance during menstruation in the absence of private, functional sanitation facilities. The result is a cyclical relationship between poor WASH conditions and limited educational opportunities, which perpetuates inequality and hinders socioeconomic development[5].

In Africa, although there have been efforts to invest in water and sanitation infrastructure, many countries face ongoing obstacles related to political instability, population growth, and insufficient funding[6]. Somalia, in particular, has been deeply affected by decades of armed conflict, environmental degradation, and weak governance. These factors have severely disrupted the development and maintenance of WASH infrastructure. Only around 45% of Somalia's population has access to improved water sources, and just 25% can access improved sanitation facilities near their homes. Consequently, waterborne diseases such as diarrhea remain among the leading causes of child mortality and are closely associated with undernutrition and poor living conditions[7].

National and regional data indicate a strong correlation between areas with high rates of food insecurity and those lacking safe water and sanitation services. Unsafe hygiene behaviors—such as using contaminated water for drinking and cooking or practicing open defecation—contribute to both chronic and acute illnesses. Integrated interventions that combine WASH improvements with nutrition programs and health education are essential to break the cycle of poverty and disease[8].

In Somalia, addressing the WASH crisis is not only a public health priority but also a critical step toward achieving broader development goals. Understanding the existing gaps in awareness and practice at the community level is fundamental for designing effective interventions. The Purpose of this study is to identify the knowledge and awareness about water to sanitation and hygiene practices among the selected urban areas of Somalia.

2. Methodology

2.1. Study setting and design

This study was conducted in Wadajir District, an urban area in Mogadishu, Somalia, characterized by high population density and limited access to water, sanitation, and hygiene (WASH) services. The study employed a cross-sectional quantitative research design, which involves collecting data at a single point in time from a representative sample. This approach was selected to assess the knowledge, attitudes, and practices related to WASH among residents and to analyze the association between demographic variables and hygiene behavior. The study was conducted over a period of seven months, from January 2024 to July 2024

2.2. Sample size and sampling method

The sample size was determined using a standard sample size calculation formula for finite populations. Based on this calculation, the required sample size was 125 participants. To ensure that the study sample was representative of the wider population, a stratified random sampling method was employed. The population was stratified by key demographic characteristics such as age, gender, and education level. Within each stratum, a proportional number of participants were selected using a computer-generated random number system. This method minimized selection bias and ensured that all individuals within the target population had an equal chance of being selected.

2.3. Inclusion and exclusion criteria

The study included participants who were permanent residents of Wadajir District, Mogadishu, aged 18 years and above, and who provided informed consent to take part in the research. Individuals were excluded if they were not permanent residents of the district or if they were unwilling to consent or unable to complete the questionnaire due to physical or cognitive limitations.

2.4. Study approach

The study used a quantitative research approach to explore the factors contributing to inadequate water sanitation and hygiene practices. Data were collected on various independent variables, including age, gender, income, education, and marital status, to assess their impact on WASH behavior.

2.5. Research instrument

Data collection was carried out using a structured, self-administered questionnaire and direct observations. The questionnaire was designed to gather information on participants' demographic characteristics, knowledge, attitudes, and practices related to WASH. The instrument was reviewed for content validity and pre-tested in a similar setting to ensure clarity and relevance.

2.6. Ethical considerations

The study protocol was submitted to the Research Ethics Committee (REC) of the Faculty of Allied Health Sciences (FAHS), Daffodil International University (DIU), for ethical review and approval. Participation in the study was entirely voluntary. Before data collection, participants were informed about the

objectives of the study, and informed consent was obtained. Anonymity and confidentiality were strictly maintained throughout the research process. No identifying personal information was collected or disclosed.

2.7. Data analysis

Data were analyzed using SPSS. Descriptive statistics such as frequencies, percentages, means, and medians were used to summarize demographic data and WASH-related variables. Results were displayed through tables, charts, and graphs. The independent variables included income level, age, gender, education level, and marital status. These were analyzed in relation to the dependent variable—the level of WASH practice.

3. Results

The socio-demographic characteristics of the study participants (N=125) paint a clear picture of a predominantly young, highly educated, and urban sample. The gender distribution was skewed towards males, who constituted 68.8% (n=86) of respondents, compared to 31.2% (n=39) females. A significant majority of the participants, 75.2% (n=94), were young adults aged 20-25 years, with the entire sample falling between 15 and 35 years of age. This youthfulness was further reflected in the marital status, where nearly half (48.0%, n=60) identified as single. The most striking feature of the cohort was its exceptionally high level of educational attainment, with an overwhelming 93.6% (n=117) having received a university-level education. In terms of employment, students formed the largest group at 40.8% (n=51), followed by those employed full-time (30.4%, n=38) and the unemployed (18.4%, n=23). Geographically, the vast majority of respondents (85.6%, n=107) resided in urban areas, with only 14.4% (n=18) from rural settings. This specific demographic profile—characterized by youth, high formal education, urban residence, and a significant proportion of students—is critically important for contextualizing the study's subsequent findings on WASH knowledge and awareness, as these factors are likely to profoundly influence perceptions, practices, and access to information regarding water, sanitation, and hygiene (Table 1).

Table 1. Socio-demographic characteristics of the study participants (N=125)

Variable	Category	Frequency (n)	Percentage (%)
• Gender	Male	86	68.8
	Female	39	31.2
• Age Group (Years)	15-20	12	9.6
	20-25	94	75.2
	25-30	17	13.6
	30-35	2	1.6
• Marital Status	Single	60	48.0
	Married	37	29.6
	Engaged	26	20.8
	Separated	2	1.6
• Education Level	University	117	93.6
	Secondary	4	3.2
	Primary	2	1.6

Variable	Category	Frequency (n)	Percentage (%)
	Illiterate	2	1.6
• Employment Status	Student	51	40.8
	Employed (Full-time)	38	30.4
	Unemployed	23	18.4
	Employed (Part-time)	13	10.4
• Place of Residence	Urban	107	85.6
	Rural	18	14.4

Table 1. (*Continued*)

The findings reveal an encouragingly high level of overall knowledge and awareness of critical Water, Sanitation, and Hygiene (WASH) issues among the study participants. Awareness was most pronounced regarding the role of broad environmental and behavioral factors, with an overwhelming majority of respondents recognizing that climate change contributes to poor WASH outcomes (92.8%, n=116) and that improper water handling is a causative factor (90.4%, n=113). Furthermore, more than four-fifths of the participants demonstrated understanding of specific contamination risks, agreeing that open defecation (81.6%, n=102), animal feces (81.6%, n=102), and inadequate sanitation facilities (83.2%, n=104) can compromise water quality and hygiene. Practical knowledge was also strong, as 82.4% (n=103) of respondents reported knowing how to use Aqua Tap water treatment technology. While still a high figure, awareness of the serious health problems specifically linked to poor WASH was the lowest among the measures, though still acknowledged by more than three-quarters of the sample (76.8%, n=96). This high baseline of awareness provides a solid foundation for public health interventions, with the slight gap in health-specific knowledge indicating a potential area for targeted educational campaigns (Table 2).

Table 2. Knowledge and awareness of water, sanitation, and hygiene (WASH) issues among respondents (N=125)

Knowledge and Awareness Statement	Response	Frequency (n)	Percentage (%)
• Climate change contributes to poor WASH	Yes	116	92.8%
	No	9	7.2%
• Improper water handling causes poor WASH	Yes	113	90.4%
	No	12	9.6%
• Open defecation contributes to poor WASH	Yes	102	81.6%
	No	23	18.4%
• Animal feces affect water sources	Yes	102	81.6%
	No	23	18.4%
• Sanitation facilities can cause water contamination	Yes	104	83.2%
	No	21	16.8%
• Know how to use Aqua Tap	Yes	103	82.4%
	No	22	17.6%
• Aware of serious health problems from poor WASH	Yes	96	76.8%
	No	29	23.2%

When asked to specify which health problems they associated with poor water, sanitation, and hygiene, respondents identified three main illnesses. Cholera was the most commonly recognized health consequence, cited by 47.2% (n=59) of participants. This was followed by diarrhoea, which was identified by 36.0% (n=45)

of respondents. Typhoid was also acknowledged as a related health problem, though by a smaller proportion of the sample (16.8%, n=21). The findings indicate that cholera is the most salient health concern in this population in relation to WASH issues, reflecting possibly higher awareness of cholera outbreaks or prevention campaigns in the region. The recognition of all three water-borne diseases demonstrates a substantive understanding of the serious health implications of inadequate water and sanitation facilities (Table 3).

Table 3. Respondents about the problems related to the poor water sanitation

Variable	Frequency	Percentage
Cholera	59	47.2%
Diarrhea	45	36.0%
Typhoid	21	16.8%
Total	125	100%

The investigation into water source preferences revealed a clear hierarchy among respondents. Groundwater emerged as the overwhelmingly preferred source, selected by more than half of the participants (56.8%, n=71). This was followed by shallow wells (16.0%, n=20) and spring-fed wells (15.2%, n=19), which demonstrated similar levels of preference. Boreholes were the least favored option, chosen by only 12.0% (n=15) of respondents. This preference pattern suggests that groundwater is either the most accessible, trusted, or familiar water source within the study area. The relatively lower preference for boreholes might indicate issues related to accessibility, water quality perception, or maintenance challenges associated with this technology.

Table 4. Respondents about the preferred water source

Variable	Frequency	Percentage
Ground water	71	56.8%
Spring-fed wells	19	15.7%
Shallow wells	20	16.5%
Boreholes	15	9.1%
Total	125	100%

4. Discussion

This study provides a comprehensive assessment of knowledge, awareness, and practices regarding water, sanitation, and hygiene (WASH) among residents in an urban area of Somalia. The findings reveal both encouraging patterns and areas requiring targeted intervention, with significant implications for public health policy in fragile states.

4.1. Socio-demographic context and comparative analysis

The study population was characterized by a predominantly young (75.2% aged 20-25 years), highly educated (93.6% university level), and urban (85.6%) demographic profile. This stands in stark contrast to typical Sub-Saharan African populations where educational attainment is generally lower. For instance, according to World Bank data, the gross tertiary enrollment rate across Sub-Saharan Africa was approximately 9% in 2018, significantly lower than the educational profile observed in this study. This exceptional educational attainment may reflect the urban focus of the study and suggests that findings may represent a best-case scenario within the Somali context[9].

When compared to similar studies across Africa, our findings demonstrate interesting patterns. In rural Ethiopia, a study by Alemu et al. (2021)[10] found only 42.3% of respondents had adequate knowledge of water treatment methods, substantially lower than the 82.4% Aqua Tap knowledge reported here. Similarly, in conflict-affected regions of South Sudan, WASH awareness levels rarely exceeded 60% for most indicators. The high awareness levels in our study (76.8-92.8% across indicators) may reflect both the urban setting and the exceptional educational profile of participants[11].

4.2. Knowledge and awareness patterns in regional context

The remarkably high awareness of climate change's impact on WASH (92.8%) is particularly noteworthy given that climate awareness in many African contexts typically focuses on agricultural impacts rather than WASH implications. This finding contrasts with a study in Nigeria where only 38.2% of urban residents connected climate change to water quality deterioration. The high awareness in our Somali sample may reflect the country's acute vulnerability to climate shocks, including recurrent droughts and floods that directly impact water access[12].

The awareness of animal feces as a contamination source (81.6%) exceeds rates reported in similar studies across East Africa. In Kenya's urban informal settlements, for instance, only 54% of residents recognized animal waste as a significant contamination source (Onyango et al., 2021). This heightened awareness in Somalia may reflect the integration of livestock within urban environments, making animal-human transmission pathways more visible. The high level of practical knowledge regarding Aqua Tap usage (82.4%) is exceptional when compared to similar technologies in other African contexts[12]. In Malawi, only 31% of households reported familiarity with similar point-of-use water treatment technologies. This suggests potentially successful previous WASH interventions in the study area or effective community-based knowledge transfer[14].

4.3. Health awareness in context of disease burden

The identification of cholera (47.2%) as the primary health concern associated with poor WASH aligns with Somalia's disease burden profile. The country has experienced repeated cholera outbreaks, with 15,000 cases reported in 2022 alone[15]. This finding mirrors patterns in Zambia and Tanzania where cholera recognition predominates due to recent outbreaks. However, the relatively lower recognition of typhoid (16.8%) as a WASH-related illness contrasts with studies from Pakistan and Bangladesh where typhoid awareness exceeds 70%[16]. This discrepancy may reflect differences in disease surveillance, reporting, and public health messaging between regions.

4.4. Water source preferences and infrastructure challenges

The strong preference for groundwater (56.8%) aligns with patterns across water-stressed regions of Africa. In the Sahel region, groundwater accounts for approximately 80% of domestic water use due to its reliability compared to seasonal surface water. However, this preference presents sustainability concerns, as groundwater resources in Somalia face increasing pressure from population growth and climate variability. The relatively low preference for boreholes (12.0%) contrasts with findings from rural Ethiopia and Kenya where boreholes are often preferred due to their perceived reliability[17]. This discrepancy may reflect maintenance challenges, water quality issues, or accessibility barriers specific to the urban Somali context.

5. Conclusion

This study reveals unexpectedly high WASH awareness among an urban Somali population, with strong recognition of climate impacts, contamination risks, and water treatment methods. While exceptional educational attainment and urban residence likely contribute to this awareness, a persistent

knowledge-practice gap remains due to structural constraints. The findings challenge assumptions about fragile states and highlight the value of existing educational investments. Strategic priorities include leveraging this awareness for targeted health messaging, sustainable groundwater management, and addressing implementation barriers. Future research should expand to rural areas and track knowledge-practice dynamics over time to inform effective public health interventions in complex settings.

6. Recommendations

The high baseline awareness documented in this study provides a strong foundation for WASH interventions. However, the gap between knowledge and practice—a well-documented challenge across low-income settings—must be addressed. Based on our findings and comparative analysis, we recommend:

1. **Leverage existing knowledge**: The high educational attainment and WASH awareness suggest that information-based interventions alone may be insufficient. Programs should focus on addressing structural barriers to implementing WASH knowledge.
2. **Context-specific messaging**: While cholera awareness is high, targeted education on other WASH-related illnesses (particularly typhoid and chronic diarrheal diseases) could strengthen prevention efforts.
3. **Infrastructure investment**: The preference for groundwater warrants investment in sustainable groundwater management and protection against contamination, particularly in urban settings.
4. **Technology adaptation**: The high Aqua Tap knowledge suggests receptivity to water treatment technologies, but affordability and maintenance support remain crucial for sustained adoption.
5. **Regional knowledge sharing**: Somalia's relatively high WASH awareness despite conflict and fragility offers lessons for other post-conflict states in the region.

7. Limitations

This study's urban focus and highly educated sample limit generalizability to rural populations with lower educational attainment. Future research should examine knowledge-practice gaps more directly and explore how high awareness translates to behavior change in resource-constrained settings. Longitudinal studies tracking WASH knowledge and practices amid Somalia's rapid urbanization would provide valuable insights for policy makers. While Somalia faces significant WASH challenges common to fragile states, this study reveals unexpected strengths in population knowledge and awareness that provide a foundation for effective public health interventions. The patterns identified offer important insights for WASH programming not only in Somalia but across conflict-affected regions of Africa.

Conflict of interest

The authors declare no conflict of interest.

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