Assessment of Awareness on Health Impact of Drinking Unsafe Water in Hargeisa, Somaliland

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Abstract

a cross-sectional study was conducted at Hargeisa from June to November 2019 to assess awareness and health impacts for drinking unsafe water in Hargeisa. A total of 384 respondents were participated. Out of 384 respondents participated in this study, 69% (265/384) of the respondents are aware of the health impacts for drinking unsafe water, whereas the rest 31% (119/384) are not aware health impacts for drinking unsafe water in the study area. Source of water in this study are tap water (31.8%), water tank vehicle (52.1%) and both tap water and water tank vehicle (16.1%). Education and economic status of the respondents were shown to significant association with the awareness of impacts on drinking unsafe water (P < 0.05), where location, gender and age were not shown statistical significant association (P > 0.05). Drinking unsafe water leads occurrence of water borne diseases, diarrhea and kidneys complications.

Keywords Awareness, Health Impact, Hargeisa, Unsafe Water, Water

1. Introduction

A supply of clean, adequate, safe and close water supply and sanitation facilities are two of the most fundamental basic human needs and human right. Yet, according to United Nations (UN) estimates (Programme, 2003), "more than 1.1 billion people are estimated to lack access to safe drinking water while 2.4 billion people do not have adequate sanitation".

Access to safe drinking water plays an important role in human life related to health. The United Nations (UN) stated that safe and clean drinking water is a human right. Therefore, the UN declared "Water for life" program in the period from 2005-2015 and made one of the targets of the millennium development goals that shall be achieved by 2015 was halving the number of people without proper access to safe water and basic sanitation [1-2].According to the United Nations, about 40 % of the world's population lives in areas with moderate to high water stress areas. Access to clean water in Africa is one of the most critical aspects of human survival. Africa and Asia suffer the most from the lack of access to sufficient clean water. Up to 50 % of Africa's urban residents and 75 % of Asians lack adequate access to a safe water supply [3].In Africa Waste disposal and management are major challenges, which confront urban centers throughout the world. This is particularly the case in developing countries where, due to poverty, municipal budgets are often under strain [4]. As a result, they fail to cope with the ever increasing demand of both spatial and demographic growth [5].In some cases, heaps of garbage lies in the open for weeks due to shortage of vehicles required to ferry them to dump sites. On the other hand, raw sewage sometimes flows in the streets due to pipe bursts and blockages, which frequently occur in some cities and take long to be attended to due to the lack of equipment, spare parts, and funds, which are required in order to fix them. Yet in others, rivers, which pass through urban centers, have been turned into sewers as they drain waste water generated in towns and cities [6].The most common adverse health impact related to poor water quality is diarrhoea. Diarrhoeal diseases in 2000 contributed 5.7% to the global disease burden and estimated around one and half million children under five years old died because of diarrheal problems [7].A better understanding of the level of microbial water contamination can help us to develop protection program for drinking water systems. Interventions may include measures to improve the water treatment process at household level [8].Ideally, the assessment needs to be done not only at the source or piped water system intake, but also at the household level because the result at source may not reflect the water quality that is consumed by people [9].The main reasons for the gap in the study area lie in the fact that lack of quality monitoring stations, the access to the data is insufficient or if it's conducted may be not properly disseminated. Therefore, to fulfill the gab, this study will be conducting to assess awareness on impacts of drinking contaminated water in Hargeisa, Somaliland.

2. Methodology

2.1 Research Area

This study was carried out at Hargeisa which is a capital city of Somaliland. It is located in a valley in the northwestern part of the country. The city is situated in a mountainous area; the temperature ranges between 13 and 32 o degrees Celsius (55 and 89 degrees Fahrenheit). Hargeisa has a semi-arid climate. The city receives the bulk of its precipitation between the months of April and September, averaging just less than 400 mm of rainfall annually.

2.2 Research Design

A cross- sectional study was conducted at Hargeisa from May to September 2019 to assess health impacts for drinking unsafe water.

2.3 Study Population

Study population of the study was households in the selected districts.

2.4 Target Population

Target population of this study was all households in Hargeisa district.

2.5 Sample and Sampling

2.5.1 Sample Size

The sample size required in the study was determined using the formula given by [12] for random sampling.

$$n= (1.96)^2 \, Pexp \, (1-Pexp)/ \, d^2$$

Where,
n = required sample size
Pexp = expected prevalence
d2 = desired absolute precision

Expected prevalence of 50 % was used since there were no prior works done in the study areas. 0.05 desired absolute precision and 95% level of confidence was used for the study. Therefore, a total of 384 respondents were used in the study. In this study 384 respondents were interviewed including poor and vulnerable population such as IDPs camps.

2.5.2 Sampling Techniques

Hargeisa has 6 districts (Ibrahim Koodbur, 26 June, Gacan Libax, Ahmed Dhagah, Mohamoud Haybe and 31 May). Six clusters were divided in the population based on districts by using cluster sampling method. All six clusters were sampled by using simple random sampling, where 64 households were selected randomly from each cluster.

2.6 Data Collection

2.6.1 Data Collection Methods

Data used in this study was based on questionnaire for selected households in Hargeisa district. Primary data collection on awareness and impacts for drinking unsafe water was collected using questionnaire form for qualitative information. Awareness of health impacts of unsafe water, family economic status and water source (water systems) were documented.

2.6.2 Data Collection Instruments

The following instrument was used in the study in order to achieve accurate and valuable information; paper questionnaires. The questionnaires were distributed to the respondents to fill.

2.6.3 Research Procedure

After receiving an approval letter from the University, Questionnaires was prepared based on the specific objectives of the study, then it was printed based on the number of respondents of the study, plus 10 additional forms. After preparing and printing the questionnaires, respondents were informed and administered questionnaire to fill or answer assigned questions. After data collection, questionnaire forms were checked is there any missing information. Collected data was sorted and entered in an excel spread sheet 2010.

2.7 Data Analysis

Data was entered into Microsoft Excel spread sheet 2010. Descriptive statistics were used to determine the frequencies and percentages, while Chi-square test analysis were employed to test the presence of association between awareness level of health impacts of drinking unsafe water and the risk factors (Location, gender, Age, Education level and economic status of the households). Confidence level was hold at 95% and P < 0.05 was set for significance. All statistical analysis was performed using STATA software package version 12.

3. Results

3.1 Assessments of Awareness Level of the Health Impacts of Drinking Unsafe Water in the Study Area.

Out of 384 respondents that participated, 69% (265/384) of the respondents were aware of the health impacts on drinking unsafe water, whereas the rest 31% (119/384) weren't aware health impacts for drinking unsafe water in the study area as shown in the table below.

Variables	Frequency	Percentage
Do you aware health impact for drinking unsafe water?		
Yes	265	69
No	119	31
Total	**384**	**100**

TABLE 1: ASSESSMENTS OF AWARENESS ON IMPACTS OF DRINKING UNSAFE WATER IN THE STUDY AREA

3.2 Household's Water Status in the Study Area.

Water status at household level was conducted such as water source, household's water satisfaction, water treatment systems and cleaning of water tanks. Out of 384 respondents that participated, 31.8%, 52.1% and 16.1% of the respondents use water from tap water; water tank vehicle and both tap water and water tank vehicle, respectively.

On the other hand, Table 2 shows that 32.6% of the respondents were satisfied for their water conditions, whereas the rest 67.4% were unsatisfied to the water system condition. However, 29.4% of the respondents used water treatment, while the rest 70.4% do not use water treatment as shown in the Table 2.

Variables	Frequency	Percentage
What is the main source of water used in your home?		
Tap water	122	31.8
Water tank Vehicle	200	52.1
Both	62	16.1
Are you satisfied water condition in your District?		
Satisfied	125	32.6
Unsatisfied	259	67.4
Do you treat your water in any way to make it safer to drink?		
Yes	113	29.4
No	271	70.6
If yes, what do you usually do to the water to make it safer to drink?		
Boil	34	30
Add bleach/chlorine	53	46.9
Use a water filter	3	2.7
Let it stand and settle	23	20.4
Do you clean water tanks in your home for the last six month?		
Yes	253	65.9
No	131	43.1
If yes, how many times do you clean or check water tanks in your home?		
Once in a month	60	23.7
Every three month	109	43.1
Every six month	84	33.2
Total	384	100

TABLE 2: HOUSEHOLD'S WATER STATUS IN THE STUDY AREA

3.3 Possible Causes and Health Impacts for Drinking Unsafe Water

Causes of water contamination and its health impacts for human consumption were assessed in this study. Out of 384 respondents interviewed, 49.5%, 13.5%, 3.1% and 33.9% of the respondents responded that unsafe water were caused by unprotected source, agricultural waste products, sewages and chemicals, respectively. Similarly, 32.6%, 27.9% and 39.5% of the respondents in this study had shown that drinking unsafe water leads to diseases, kidney problems (complication) and diarrhea respectively as shown in the Table 3 below.

Variables	Frequency	Percentage
What are the causes of water contamination (unsafe water)?		
Unprotected source	190	49.5
Agricultural waste product	52	13.5
Sewages	12	3.1
Chemicals	130	33.9
What are possible health impacts for drinking unsafe water?		
Diseases (cholera, Typhoid)	125	32.6
Kidney complications	107	27.9
Diarrhea	152	39.5
Total	384	100

TABLE 3: POSSIBLE CAUSES AND HEALTH IMPACTS FOR DRINKING UNSAFE WATER

3.4 Awareness Of Households With the Identified Risk Factors

Awareness of drinking unsafe water in relation to location of the households was assessed, and this was statistically insignificance between different locations of the households (P > 0.05).

Household's awareness for drinking unsafe water in relation to gender of the respondents, high un- awareness were reported in females (31.7 %) compared to the males (29.4 %), but this difference was not statistically significance between gander (P>0.05).

High un-awareness was recorded in respondents whom age were less than 25 years (44.7 %) compared to respondents with 25-50 years (28.5%) and above 50 years of age (33.8%). This difference was not statistically significance between age of the respondents (P>0.05).

Awareness of the households in relation to educational level, high un-awareness were recorded in illiterate respondents (60%) compared to the literate (17%) respondents. There was strong statistical significance between educational level of the respondents (P<0.05).

Economic status of the respondents was also assessed, where higher un-awareness was reported in poor households (52.7%) compared to medium (15.7%) and rich (11.1 %) households, and there was strong statistical significance between economic statuses of the households (P<0.05) as shown in the table below.

Variables	Household's awareness		X^2	P-value
	Aware (%)	Un- Aware (%)		
Location				
Ibrahim Koodbur	47 (73.4 %)	17 (26.6 %)	1.6682	0.893
26- June	46 (71.9%)	18 (28.1 %)		
Gacan Libaax	45 (70.3 %)	19 (29.7 %)		
Ahmed Dhagax	43 (67.2 %)	21(32.8 %)		
Mohamoud Haybe	42 (65.6 %)	22 (34.4 %)		
31- May	42 (65.6 %)	22 (34.4 %)		
Gender				
Male	84 (70.6 %)	35 (29.4 %)	0.2007	0.654
Female	181 (68.3 %)	84 (31.7 %)		
Age				
<25 Years	21 (55.3 %)	17 (44.7 %)	4.4403	0.109
25-50 Years	201(71.5 %)	80 (28.5%)		
>50 Years	43 (66.2 %)	22 (33.8 %)		
Literacy				
Literate	215 (83 %)	44 (17 %)	72.9322	0.000
Illiterate	50 (40 %)	75 (60 %)		

Economic status				
Poor	80 (47.3 %)	89 (52.7 %)	66.7878	0.000
Medium	113 (84.3 %)	15 (15.7 %)		
Rich	72 (88.9 %)	9 (11.1 %)		

TABLE 4: ASSOCIATION OF RISK FACTORS TO THE HOUSEHOLD'S AWARENESS ASSESSMENTS

4. Discussion

The present study revealed that 69% of the respondents were aware health impacts on drinking unsafe water, whereas the rest 31% weren't aware health impacts for drinking unsafe water in the study area. This might be due to different in perception, education level or economic status of the respondents.

Ages of the respondents were reported in this study; 73 % of the respondents were between 25 and 50 years where the rest of the respondents were below 25 years, and above 50 years. On the other hand, majority of the respondents were poor and medium economic level of the households. This could be due to high unemployment rate and lack of investments of the country.

Households in the study area receive water from different sources (tap water and water tank vehicles) therefore; majority of the households (52.1%) use water from water tank vehicle. This could be due to scarcity of tap water and increased population in the study area.

On the other hand, majority of households (67.4%) were unsatisfied for their water condition where the rest 32.6% were satisfied for the water system. This could be a different perception, awareness and education level of the households.

In this study, respondents were asked for their use of water treatment to make water safer for drinking, majority of the households (70.4%) did not use any water treatment while the rest 29.4% were used treated water for drinking. This might be due to different in household's water satisfaction and awareness on health impacts for drinking unsafe water.

Different water treatment systems were used by the households in the study area, such as boiling, chlorination, and filtering of water; where 46.9% and 30% of the households used treatments to make water safer for drinking use chlorination and boiling of water respectively. This could be due effectiveness of this two options for treating water in order to make it safer for drinking in long time.

In other hand, 65.9% of the respondents clean their water tanks where the rest 34.1% did not clean the water tanks for the last six month. However, majority of those whom clean their water tanks (43.1%) clean by every three month where the some household clean every month and some for every six month. This difference could be due to difference in satisfaction of water condition, awareness, source of water and also difference on the water tank is self.

Causes of water contamination and its health impacts for human consumption were assessed in this study; therefore unprotected source and chemicals were the major causes for unsafe water as responded by 49.5% and 33.9% of the respectively. This might be that sources of water may not be protected as required and lack chlorination of public water tanks

This study reveals that drinking unsafe water leads occurrence of water born disease, kidney problems and diarrhea as responded by 32.6%, 27.9% and 39.5% respectively. This could be due presence of pathogenic micro-organisms in the water that causes water borne diseases and diarrhea, as well as due to presence of chemicals and minerals that might lead to kidney complications to the population. Gender and age of respondents did not shown significance association with the awareness of impacts of drinking unsafe water. This might be due to difference in educational and economic background of the respondents.

Educational background of the respondents had significance association with the awareness of drinking unsafe water in which illiterate respondents (60%) was recorded high unawareness than literate respondents (17%). This association could be explained that education helps awareness on health impacts on drinking and use of unsafe water and causes of water contamination. Also education helps to understand importance of treated water, how to treat water to be safe and regular use of water treatment.

On the other hand, economic status of the households had significant association with the awareness of impacts on drinking unsafe water in which poor households (52.7%) were documented high unawareness than medium (15.7%) and rich households (11.1%). This might be due to that wealth households can choose the safe and clean water, treatment chemicals, and source of their water, where poor household's goal is based on accessibility of water in order to survive rather than the safety of water.

Conclusion and Recommendation

This study concludes that education and economic status of the households had significant association with the awareness on health impacts for drinking unsafe water. Water system condition (safety and quality) were unsatisfied to household in the study area. Uses of water treatment systems to make water safer for drinking is limited, although some of the households practiced treating drinking water by chlorination the water tanks or boiling to make is it safe for drinking. Unprotected sources of water and chemicals in the water cause water to be unsafe and contaminated at the study area. Drinking unsafe water cause and predispose occurrence of

water borne diseases, diarrhea and kidneys complications.
Based on above concluding remarks the following recommendations were forwarded: Public awareness campaigns should be conducted by the government to increase awareness level of the community on health impacts for drinking unsafe water and importance of use of water treatment. Water quality assessments should carry out by minster of water resources and Hargeisa water agency. Sources of water should be protected and regularly checked by the ministry of water resources. Every household in the study area should practice water treatments and regularly clean their water tanks.

References
1. Bloomfield, S. F., Exner, M., Signorelli, C., Nath, K. J., & Scott, E. A. (2012, July). The chain of infection transmission in the home and everyday life settings, and the role of hygiene in reducing the risk of infection. In International scientific forum on home hygiene.
2. Dow, K. (1992). Exploring differences in our common future (s): the meaning of vulnerability to global environmental change. Geoforum, 23(3), 417-436.
3. Fosgate, G. T. (2009). Practical sample size calculations for surveillance and diagnostic investigations. Journal of veterinary diagnostic investigation, 21(1), 3-14.
4. Frisbie, S. H., Mitchell, E. J., & Sarkar, B. (2015). Urgent need to reevaluate the latest World Health Organization guidelines for toxic inorganic substances in drinking water. Environmental health, 14(1), 1-15.
5. Jordan, J. D. (1984). Local government in Zimbabwe: an overview. (No Title).
6. Mapira, J. (2011). River pollution in the city of Mutare (Zimbabwe) and its implications for sustainable development. Journal of Sustainable Development in Africa, 13(6), 181-194.
7. Programme, W. W. A. (2003). Water for People, Water for Life: The United Nations World Water Development Report: Executive Summary.
8. Pruss-Ustun, A., & World Health Organization. (2008). Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health. World Health Organization.
9. Soomro, A., Siyal, A. A., Mirjat, M. S., & Sial, N. B. (2014). Seasonal variations of trace elements and heavy metal concentrations in Phuleli Canal water (Sindh), Pakistan. Sarhad J Agric, 30, 73-82.
10. St Laurent, J., & Mazumder, A. (2014). Influence of seasonal and inter-annual hydro-meteorological variability on surface water fecal coliform concentration under varying land-use composition. Water Research, 48, 170-178.
11. Tietenberg, T., & Lewis, L. (2018). Environmental and natural resource economics. Routledge.
12. Wright, J., Gundry, S., & Conroy, R. (2004). Household drinking water in developing countries: a systematic review of microbiological contamination between source and point-of-use. Tropical medicine & international health, 9(1), 106-117.