
COMMUNITY PERCEPTION ON QUANTITY, QUALITY AND REASONS FOR TREATING DRINKING WATER IN SATELLITE TOWNS OF MWANZA CITY

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ABSTRACT

The aim of this study was to assess the perception of Community on the quantity, quality and reasons for treating drinking water in three Satellite Towns of Mwanza City in Tanzania, namely Misungwi, Magu and Lamadi. A cross sectional study design was employed in carrying out this study where a sample size of 417 respondents was chosen. Study results indicated that the average quantity of water collected per day was higher in Lamadi (177 litres) than in Misungwi (167 litres) and Magu (162 litres). Consequently, households in Lamadi used more water than their counterparts in Misungwi and Magu. Water use per capita per day was about 26 litres, 25 litres and 25 litres in Misungwi, Magu and Lamadi, respectively. This means that the quantity of water used in the study towns meets the minimum threshold of 25 litres per capita per day as recommended by the Tanzania national water policy. Drinking water from the main sources was not properly treated. Perception of respondents with regard to quality of drinking water in all towns indicated that water was 'clean': 53%, 60%, and 60% in Misungwi, Magu and Lamadi, respectively. However, about one third of respondents in Magu (32%) and Lamadi (32%) reported that water had 'some particles'. This could mean that the quality of drinking water in these towns was not assured. Regarding treatment of water at household level, respondents in Lamadi reported that they treat their drinking water before consumption (80%) compared to 68% in Magu. However, in Misungwi, 78% of the households did not treat their drinking water. Most of the respondents in Misungwi (40%) and Magu (38%) used pails or buckets to store their drinking water. About 32% in Misungwi and 26% in Magu used clay pots. Drums were the main water storage facility in Lamadi (41%). This study also revealed that about 53% of respondents in Lamadi and 31% in Magu used clean utensils to draw water from storage containers ready for drinking. Cups were mostly used in Misungwi (44%) and Magu (55%), however less used in Lamadi (28%). Conversely, it was reported that 'dipping hands into the water container' was practiced by 25% of the respondents in Misungwi, 22% in Magu and 20% in Lamadi. This practice could be a significant cause of drinking water contamination, which contributes to water related diseases. It is recommended that the authorities responsible with provision of water to the study towns give high priority to the quality of drinking water by constructing treatment facilities to reduce health risks associated with drinking water.

Keywords: Water Quality, Water Quantity, Water supply, Water treatment, Households.

1.0 INTRODUCTION

Water supply is vital for ensuring sustainable economic and social development for human welfare. Statistics indicate that more than 1.1 billion people in the world (eighty percent of them rural dwellers) are denied the right to access clean and safe drinking water, and 2.4 billion have no access to proper sanitation (Grey, 2006; UNICEF and WHO, 2012a). As well, around 84% of the people who do not have access to clean water services reside in rural areas (DFID, 2011). As a result, every year 2.2 billion people die from water-related diseases and 1.87 million children die from diarrhoea, ninety percent of which results from unsafe drinking water.

In Tanzania, as in many other sub-Saharan African countries, numerous people do not have access to safe water regardless of the establishment of National Water Policy of 2002, Water Resource Management Act of 2009 (URT 2009a) and Water Supply and Sanitation Act of 2009 (URT 2009b) to govern water resources in Tanzania. Recognizing the importance of water resource, Tanzania Government further established National Water Sector Development Strategy of 2005 to 2015 and Water Sector Development Programme of 2005 to 2025 with the main goal of improving water service delivery to every citizen in Tanzania (URT 2010).

Water supply coverage in rural areas increased substantially, from 40% in 2013 to 67% in June 2015. Furthermore, water supply coverage in 19 regional headquarters increased from 84% in 2009 to 86% in 2015 (URT, 2015). However, large disparities persist between urban and rural areas, with regard to access and quality of water services. In rural areas, almost one in every two persons has no access to safe water supply service (Mwambuli, 2011). This has resulted rural Tanzanians to travel long distances, consuming over many hours to fetch water. This also has a huge negative impact on economic development and often results in girls dropping out of schools as they have to join their mothers in fetching potable water (Mwambuli, 2011). The national economy suffers because of inadequate water supply services to the urban and rural population (URT, 2002). Poverty is directly related to accessibility to clean water services, such that without it the chances of breaking out of the poverty trap are extremely slim. The social and economic consequences of lack of sustainable access to water services penetrate into realms of education, opportunities for gainful employment, physical strength and health, agricultural and industrial development, and, thus the overall productive potential of the community and the nation as a whole. With better water conditions, the burden on healthcare would be lessened bringing in a healthier workforce that would stimulate economic growth and pull many people out of poverty.

Lack of reliable and sustainable water supply services has often forced those living in water deprived areas to turn to unsafe water sources, which then contributes to the spread of water borne diseases including typhoid fever, cholera, dysentery and diarrhoea. Additionally, water scarcity has caused many people to store water in their households which increases the risk of household water contamination and incidents of malaria and dengue fever spread by mosquitoes (URT, 2002; UNICEF and WHO, 2012a; b). Water borne diseases are a leading cause of illnesses and deaths in Tanzania. While globally, 2.2 million people die each year from diarrhoea-related disease, and at any given time fifty percent of all

hospital beds in the world are occupied by patients suffering from water-related diseases, in Tanzania, more than 20,000 of children die each year due to diarrhoea and other water-related diseases (UNICEF and WHO, 2012a; b). When infected with these waterborne diseases, those suffering from water scarcity cannot contribute to the community's productivity and development because of a simple lack of strength. Additionally, economic resources are sapped by the cost of medicine to treat waterborne diseases, which takes away from resources that might have been used for food, school fees and investment in development activities. Sustainable access to water services is of paramount importance to the local population, leading directly to improved health, opportunities in education and economic ability. The present study aimed at assessing the perception of community on the quantity, quality and the reasons for treating drinking water in three Satellite Towns of Mwanza City in Tanzania, namely Misungwi, Magu and Lamadi.

2.0 MATERIALS AND METHODS

2.1 Study Area

The present study was conducted in three satellite towns of Mwanza City, namely: Misungwi, Magu and Lamadi as shown in Figure 1. Misungwi is one of eight districts in the Mwanza Region. Misungwi Town is situated adjacent to the Mwanza-Shinyanga road about 40 km south of Mwanza. Magu Township is located 61 km from Mwanza City along the Mwanza-Musoma road. Magu district shares its borders with Illemela district in the West, Bunda district in the North, Bariadi district in the East and Kwimba in the South. Lamadi is a small but fast growing township in Busega District in Simiyu Region about 70 km from Magu Town along the Mwanza – Musoma road.

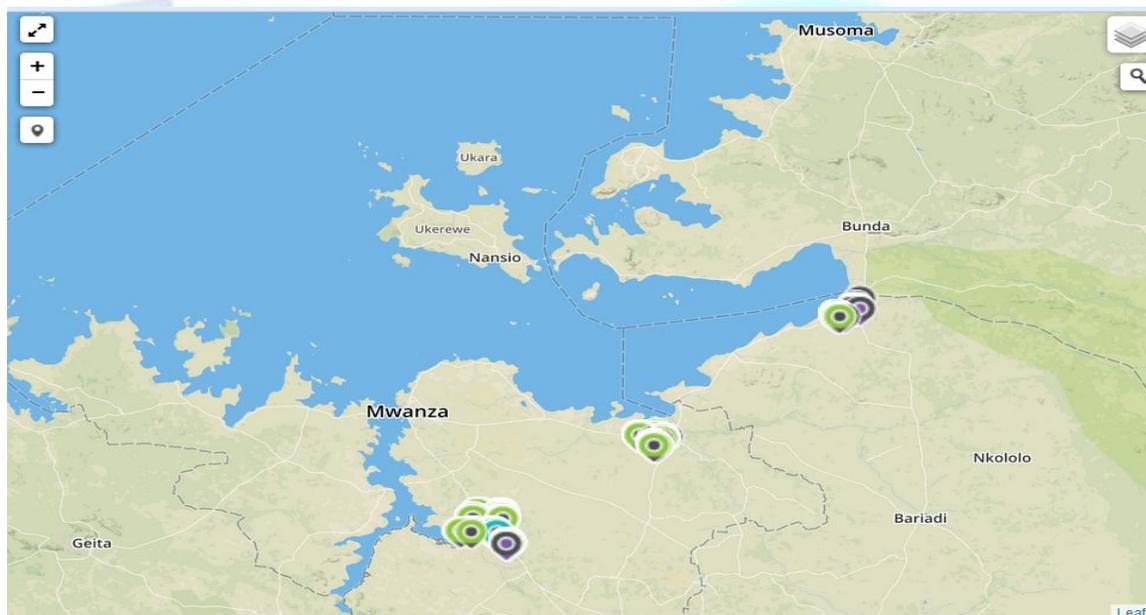


Figure 1: Study area

2.2 Study Approach and Data Collection

The approach adopted for conducting this study was participatory in nature aimed at maximizing the involvement of a variety of stakeholders. To enhance performance, the study team developed and applied a mobile based data collection system. This web based information management system was preferred as it ensures better data quality through control “ex ante” (skip logic, formatting control, etc.); significant decrease of delay in data collection process; allows the collection of rich content information including GPS coordinates, pictures, track mapping, video recordings, among many advantages. The mobile platform used was Android based phones with Poimapper programme. The study team recruited and trained six enumerators. Training of enumerators was necessary to build their capacity on how best they can handle the exercise in a participatory manner including the use of the mobile platform. Prior to the main fieldwork, a preliminary survey was conducted. The objectives of the survey were to test the suitability and relevance of the prepared tools and find out the most efficient way of carrying out the study

2.3 Study design

A cross sectional study design was used, which entailed collecting data at a single point in time which is one of the characteristic features of a cross sectional design. Validation and cross checking on the accuracy and relevance of the collected data was ensured as a result of using mobile platform which enabled checking quality of data entered by each enumerator. This helped to correct any abnormally sooner than later.

2.4 Sampling Procedures

According to Kothari (2009) sampling design is a plan for obtaining a sample from a sampling frame. Generally, it refers to the techniques or procedures used by the researcher in selecting sampling units from which inferences about the population is drawn. This study, therefore, employed multistage sampling techniques using a combination of random and purposive sampling methods. Purposive sampling was used to select villages and mitaa from Misungwi, Magu and Lamadi. Simple random sampling was used to select households from each village/mtaa for the household survey. This technique was favoured because it gives an equal chance to households to be involved in the study and, thus, reduced biasness and, hence, increased data reliability. On the other hand, purposive sampling was used to select key informants.

2.5 Sample Size

The sample size for this study was based on the total number of households according to the 2012 Tanzania population census. Since the population of the towns was large to have a sample size which is manageable and meets the requirement pointed out by Kothari (2009), a sample size calculator using a Creative Research System (2012) was used. A, 95% confidence level was used as this is the level which is commonly used by researchers (Creative Research System, 2012). Based on the aforesaid, a sample size of 417 households was selected.

2.6 Data Processing and Analysis

Data collected from the field were analyzed using both quantitative and qualitative techniques. The quantitative data collected using the questionnaire surveys were exported from the mobile platform application (Poimapper) into the Statistical Package for Social Sciences (SPSS) to make them amenable for analysis. These data were analyzed for descriptive statistics such as frequencies and means. The qualitative data obtained from observation, KII and the open-ended questions in the questionnaire were transcribed and analyzed using qualitative content analysis technique.

3.0 RESULTS AND DISCUSSION

3.1.1 Quantity of water

The Tanzania National Water Policy of 2002 on urban sub-sector aims at achieving sustainable, effective and efficient development of urban water supply and sewerage services (URT, 2002). The policy emphasizes on water resource management to ensure that water does not become a constraint to national development. Effectiveness and efficiency of water resource utilization in the country is one among the specific objectives of water resource management. The quantity of water collected and used by households is an important measure of domestic water supply because it depends on accessibility as determined by distance, time, reliability and cost. The study investigated the main sources of water in the study area. The finding indicates that the main source of water supply in Misungwi, Magu and Lamadi towns is surface source mainly from Lake Victoria. With regard to quantity of water collected results in Figure 2 show that the average quantity of water collected per day was higher in Lamadi (177 litres) than in Misungwi (167 litres) and Magu (162 litres). Consequently, households in Lamadi used more water than their counterparts in Misungwi and Magu. Across the towns, the amount of water collected and used was, however, lower than the required quantity implying limited access to water. Water use per capita per day was about 26 litres, 25 litres and 25 litres in Misungwi, Magu and Lamadi, respectively. This means that the quantity of water used in the study towns meets the minimum threshold of 25 litres per capita per day as recommended by the Tanzania Water Policy (URT, 2002).

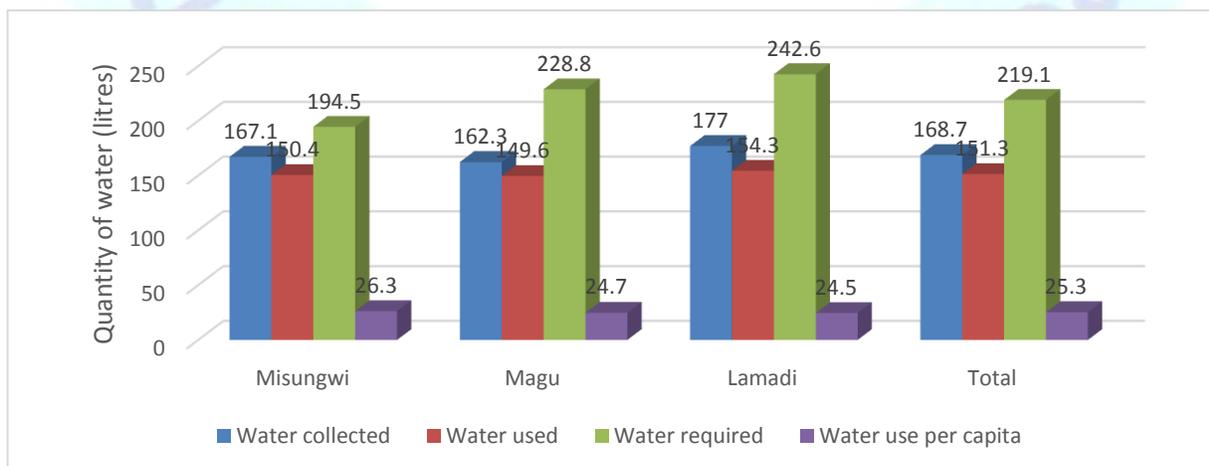


Figure 2: Average quantity of water collected and used per day

3.1.2 Quality of water

Access to safe drinking-water is essential to health, a basic human right and a component of effective policy for health protection. Access to safe drinking-water is important as a health and development issue at national, regional and local levels. In some regions, it has been shown that investments in water supply and sanitation can yield a net economic benefit, as the reductions in adverse health effects and health-care costs outweigh the costs of undertaking the interventions (WHO, 2011). WHO produces international norms on water quality and human health in the form of guidelines that are used as the basis for regulation and standard setting world-wide. It also provides among others, the important roles of many different stakeholders in ensuring drinking-water safety (WHO, 2011). Safe drinking-water, as defined by the Guidelines, does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages.

To ensure safety of water, water source protection is very important and is being emphasized in the Tanzania water policy of 2002. Water treatment processes, including disinfection and physical removal of contaminants is normally done by authority responsible for provision of water services in a certain locality. The study investigated whether water treatment was done in the study towns as it has an implication on the quality of drinking water. Information from the key informants indicated that water used in the three towns is abstracted from Lake Victoria without being properly treated. This is due to the fact that the authorities responsible for provision of water services in the study areas do not have water treatment plants. Chlorination, which is done manually is the method used to treat water. This situation suggests that quality of drinking water in the study area is questionable.

The study assessed the perception of the community with regard to the quality of drinking water. Three indicators were used to assess the quality of water: perceived impression of quality of water, drinking water treatment and use of safe water storage facilities. Majority of respondents in all towns indicated that water was 'clean': 53%, 60%, and 60% in Misungwi, Magu and Lamadi, respectively. However, about one third of respondents in Magu (32%) and Lamadi (32%) reported that water had 'some particles' (Table 1). This could mean that the quality of drinking water in these towns was not assured.

Table 1: Respondents' impression of water quality (n=417)

Quantity (in litres)	Misungwi	Magu	Lamadi	All
Clean	89(52.7)	73(60.3)	76(59.8)	238(57.1)
Has sand in it	7(4.1)	5(4.1)	5(3.9)	17(4.1)
Has small particles	26(15.4)	39(32.2)	40(31.5)	105(25.2)
Has some taste	16(9.5)	3(2.5)	4(3.1)	23(5.5)
Has odour	7(4.1)	1(0.8)	0(0.0)	8(1.9)
Others	24(14.2)	0(0.0)	2(1.6)	26(6.2)

Note: Figures in brackets are percents.

3.1.3 Treatment of water

Drinking water might be the root cause of water borne diseases especially diarrhoea, typhoid and worms if not properly treated. In Tanzania, water related diseases such as diarrhoea are a leading cause of illnesses and deaths accounting for more than 20,000 of children deaths each year (UNICEF and WHO, 2012a). The study investigated if members of the households do drink water which is treated. A large majority of respondents in Lamadi reported that they did treat their drinking water before consumption (80%) compared to slightly over two thirds in Magu (68%). However, more than three quarters of respondents in Misungwi (78%) did not treat their drinking water (Table 2). This means that majority of the surveyed households especially in Misungwi used drinking water which its quality could not be assured. This could contribute to water related diseases. Discussions with the District Medical Officers in the three towns revealed that water borne diseases especially diarrhoea, typhoid and worms were among the top ten diseases in the towns. This was also reported in the study by Atkins International Ltd and Matrix Development Consultants (2012). Lack of reliable and sustainable water supply services has been reported as the main contributing factors to the spread of water borne diseases including typhoid fever, cholera, dysentery and diarrhoea (URT, 2002; UNICEF and WHO, 2012a).

Table 2: Treat drinking water to make it safer (n=417)

Response	Misungwi	Magu	Lamadi	All
Yes	37(21.9)	82(67.8)	101(79.5)	220(52.8)
No	132(78.1)	39(32.2)	26(20.5)	197(47.2%)

Note: Figures in brackets are percents

3.1.4 Method of treating drinking water

The findings in Table 3 show that boiling was the most common drinking water treatment method used by 73% of the surveyed households in Misungwi and Magu, and by 61% in Lamadi. A substantial proportion of households in Lamadi (17%) were 'letting water to stand or settle' and another 10% used water filter (ceramic or sand). This shows that households in the study towns used a variety of drinking water treatment methods. However, the efficacy of some of these methods in ensuring drinking water safety is minimal. For example, straining through a cloth was used by 27%, 9% and 12% of the respondents in Misungwi, Magu and Lamadi, respectively. Although the method helps to avoid the particles in the water, its efficacy in avoiding other contaminants is not assured, thus, not acceptable as a means of treating drinking water.

Table 3: Drinking water treatment methods (n=220)

Treatment method	Misungwi	Magu	Lamadi	All
Boiling	27(73.0)	60(73.2)	62(61.4)	149(67.7)
Adding water guard/chlorine	0(0.0)	5(6.1)	10(9.9)	15(6.8)
Straining through a cloth	10(27.0)	7(8.5)	12(11.9)	29(13.2)
Using water filter (ceramic; sand etc	0(0.0)	6(7.3)	0(0.0)	6(2.7)
Letting it stand and settle	0(0.0)	2(2.4)	17(16.8)	19(8.6)
Other methods	0(0.0)	2(2.4)	0(0.0)	2(0.9)

Note: Figures in brackets are percents

Majority of those who were treating their drinking water stated were doing it ‘always’: 84%, 93% and 85% in Misungwi, Magu and Lamadi, respectively (Figure 3). Others said were ‘sometimes’ treating drinking, water accounting for 16% in Misungwi, 10% in Lamadi and 5% in Magu. Few respondents did it ‘often’, mostly in Lamadi (5%) and Magu (2%). This shows that most of the households that were treating their drinking knew the importance of doing so and, therefore, did it on daily basis.

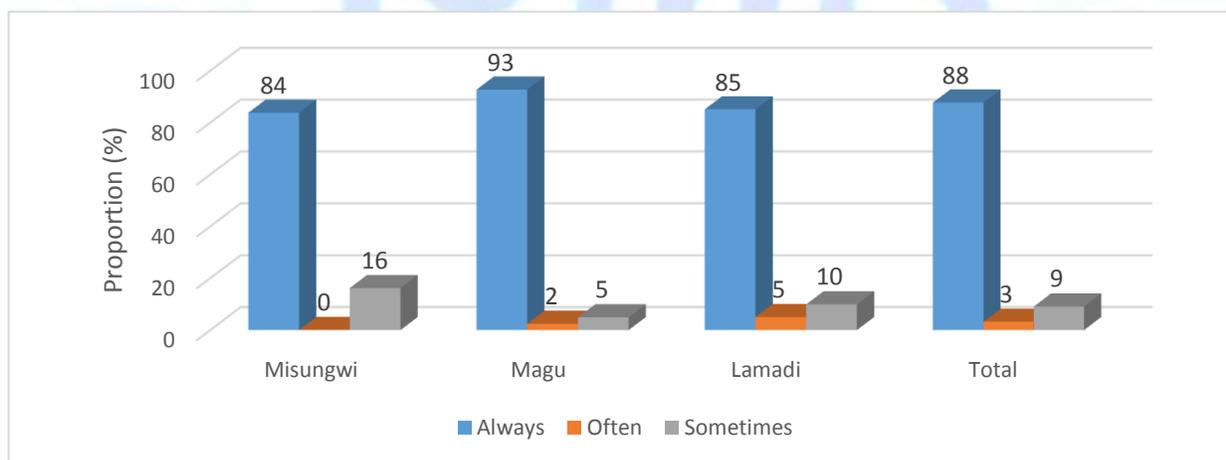


Figure 3: Frequency of treating drinking water

When asked about the reasons for treating drinking water, almost all respondents in Magu (96%) and a large majority in Misungwi (87%) and Lamadi (83%) said they did so in order to kill germs. Few respondents, mostly in Lamadi (13%) treated water to improve taste and another 5% in Misungwi and 3% in Lamadi to remove bad smell (Table 4). This also shows that majority of those treating their drinking water were aware about the rationale of doing so, which was mainly to make it clean and safer for drinking by killing germs.

Table 4: Reasons for treating drinking water (n=220)

Reason	Misungwi	Magu	Lamadi	All
Kill germs	32(86.5)	79(96.3)	84(83.2)	195(88.6)
Remove bad smell	2(5.4)	2(2.4)	3(3.0)	7(3.2)
Improve taste	1(2.7)	1(1.2)	13(12.9)	15(6.8)
Don't know	2(5.4)	0(0.0)	1(1.0)	3(1.4)

Note: Figures in brackets are percents

With regard to water storage facilities, the findings in Table 5 show that most of the respondents in Misungwi (40%) and Magu (38%) used pails or buckets to store their drinking water. About one third in Misungwi (32%) and over a quarter in Magu (26%) used clay pots. Drums were the main water storage facility in Lamadi (41%), but used by relatively few households in Misungwi (25%) and Magu (31%).

Table 5: Containers used to store drinking water (n=417)

Container	Misungwi	Magu	Lamadi	All
Jerry can	5(3.0)	4(3.3)	13(10.2)	22(5.3)
Clay pots	54(32.0)	32(26.4)	30(23.6)	116(27.8)
Pails/buckets	67(39.6)	47(38.8)	32(25.2)	146(35.0)
Drums	42(24.9)	37(30.6)	52(40.9)	131(31.4)
Other containers	1(0.6)	1(0.8)	0(0.0)	2(0.5)

Note: Figures in brackets are percents

More than half of the respondents in Lamadi (53%) and about one third in Magu (31%) used clean utensils to draw water from storage containers ready for drinking. Cups were mostly used in Misungwi (44%) and Magu (55%), but less in Lamadi (28%). However, one quarter of the respondents in Misungwi (25%), 22% in Magu and 20% in Lamadi indicated that they did 'dip hands into the water container' (Table 6). This could be a significant cause of drinking water contamination, which contributes to water related diseases.

Table 6: Methods used to draw drinking water from storage containers (n=417)

Method	Misungwi	Magu	Lamadi	All
Dip hands into the water container	42(24.9)	26(21.5)	25(19.7)	93(22.3)
Use clean utensils	53(31.4)	28(23.1)	67(52.8)	148(35.5)
Others (cups)	74(43.8)	67(55.4)	35(27.6)	176(42.2)

Note: Figures in brackets are percents

4.0 CONCLUSION AND RECOMMENDATIONS

Based on the findings presented the study found that the main source of water supply in Misungwi, Magu and Lamadi towns is surface source mainly from Lake Victoria. The quantity of water used in the study towns per day meets the minimum threshold of 25 litres per capita per day as recommended by the Tanzania national water policy. Drinking water from the three towns was reported to have some particles which suggest that the quality of drinking water in these towns was not assured. This could contribute to water related diseases. Treatment of drinking water was done aiming at killing germs. Boiling was the most common drinking water treatment method used by majority of households in the study towns. Majority of households used pails or buckets to store their drinking water. Clean utensils such as cups were used to draw water from storage containers ready for drinking. Dipping hands into the water container was also reported to be used as a means of drawing drinking water from storage containers. This could be a significant cause of drinking water contamination, which contributes to water related diseases. It is recommended that the authorities responsible with provision of water to the study towns give high priority to the quality of drinking water by constructing treatment facilities to reduce health risks associated with drinking water.

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