Effectiveness of Natural Spring Water Project in Supplying Water for Domestic Use in Kondoa in Dodoma Region

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Ikisiri

Usambazaji wa maji vijijini umekuwa tatizo katika sehemu kubwa ya Tanzania hasa katika mikoa ya Kanda ya Kati kutokana na kiasi kidogo cha mvua. Wilaya ya Kondoa ni miongoni mwa wilaya za Dodoma ambazo zinakabiliwa na changamoto kubwa ya upatikanaji wa maji. Utafiti huu ulilenga kuchunguza ufanisi wa maji asilia ya chemchemi katika kusambaza maji safi na salama kwa matumizi ya nyumbani ili kupata taarifa za kuboresha huduma ya maji katika kata ya Kondoa mjini. Taarifa zilikusanywa kwa njia ya usaili, ushuhudiaji na nyaraka mbalimbali ikiwemo vyanzo vya mtandao. Taarifa zilichanganuliwa kwa kutumia Programu ya kitakwimu ya kuchambulia data za kisayansi jamii (IBM-SPSS). Matokeo ya utafiti huu kwa ujumla yalionyesha kuwa pamoja na kuwepo kwa baadhi ya chemchemi za asili katika kata ya Kondoa Mjini, hazijaweza kusambaza maji kwa ufasaha kwa matumizi ya nyumbani. Usambazaji wa maji ya majumbani kutoka kwenye chemchemi za asili unakabiliwa na chgangamoto za miundombinu duni na isiyotosheleza, ufikivu duni huku zaidi ya dakika 30 zikitumika kuchota maji ndani ya umbali wa takriban mita 400. Zaidi ya hayo, kulikuwa na ukosefu wa uelewa wa kutosha miongoni mwa wanajamii kuhusu uhifadhi wa mazingira. Utafiti unapendekeza utunzaji wa mara kwa mara wa miundombinu ya maji, uanzishwaji wa vyanzo vingi vya maji, na kuelimisha jamii juu ya uhifadhi wa mazingira ili kulinda vyanzo vya asili.

Abstract

The world continents including Africa are experiencing water scarcity. Rural water supply has been a problem in most parts of Tanzania especially in Central Zone regions due to little amount of rainfall. Kondoa District is one among the district in the Dodoma region that experience acute water supply problems. The current study intended to investigate the effectiveness of natural spring water in supplying clean and safe water for domestic use in order to get the information for improving water supply in the Kondoa urban ward. Primary data were collected through interview method and observation while secondary data were collected through reviewing various documents and internet sources. The data were analysed descriptively using Statistical Package for services solution (IBM-SPSS) The findings generally indicated that despite the presence of some natural springs in Kondoa Urban, they have not been so effective in supplying water for domestic use. The supply of domestic water from natural springs is characterised by poor and inadequate infrastructures, and poor accessibility with more than 30-minutes being spent on water collection within a distance of about 400 metres. Furthermore, there was a lack of enough awareness among the community members on environmental conservation. The study recommends regular maintenance of water infrastructures, the establishment of more water sources, and educating the community on environmental conservation in order to protect Natural Springs.

Keywords: Natural Spring, Water Supply, Domestic water use, Kondoa urban

1.0. Introduction

Water is one of the most vital natural resources for all life on earth of which is considered to cover 75% of the planet earth mostly in seas and oceans, in which only 2.5% is freshwater (Lufingo, 2019). It is vital for all known forms of life, since all animals, plants and people need water in order to live, even though it does not provide calories or organic nutrients (Raut, 2014). Water is used in many ways, for domestic purposes, in industry, in commercial establishments such as hotels and restaurants, in agriculture for farming and animal keeping, and for emergency uses such as fire-fighting (Lufungo, 2019). According to Mekonnen & Hoekstra, (2017). Also, water occurs as groundwater (1.7%), in the glaciers and the ice caps of Antarctica and Greenland (1.7%). In the air, water occurs as vapour and clouds formed as ice and liquid water suspended in air, and precipitation (0.001%).

The world continents are experiencing water scarcity, which in general refers to a condition where the demand of water by all sectors, cannot be fulfilled due to the impact of water consumption on the supply and quality of water (Bogardi, 2012). In the Global Risk 2015 Report of the World Economic Forum, the water supply crisis has been recognized as one of the top five crises facing the globe over the next 10 years (Harden, 2020). However, both developed and developing nations do experience severe shortages and live with less than 500 m^3/person per year, which can be considered as water scarcity Two-third of the global population live under condition of severe scarcity of water at least 1 month of the year (Mudiyensalage & Rantharu, 2018). Fair water shortage in the world emerged around 1800, but it commenced serious from about 1900 when 2% of the world population experienced constant water shortage, with access to less than 1000 m^3/capital per year (Wild *et al.*, 2010).

Africa is the second driest continent in the world after Australia. It suffers from acute water scarcity where the presence of long desert in the northern part of Africa contribute to water stress, water deficit and water crisis. Less than 50% of people in rural Africa have little access to both improved clean water and sanitation. This is because of poor water infrastructures and little government involvement (Seckler *et al*., 2015). According to the inventory carried out from 2010 to 2015 by (MWT,2015), despite the fact that Tanzania has about 27,514 water sources including 2, 325 springs, 14 lakes and 426 dams, and 19,514 deep wells and over 100,000 shallow wells, but faces a shortage of water supply in both rural and urban areas at large. Under the Millennium Development Goal declaration, the world recognized the minor, although still a determined, goal of having the proportion of people lacking access to clean and safe water by 2015 (Motala, 2015). Also, in Tanzania, many regions especially in the central zone regions namely Singida and Dodoma had poor coverage for domestic water supply. In rural areas, it was about 58.7% and 84% in the urban areas (Kamara *et al*., 2017).

Dodoma is one of the regions in Tanzania that experience, water shortage and water crisis due to the nature of the area which is semi-desert and semi-arid with the little amount of rainfall. Rural water supply has been a problem in Dodoma because of the nature of the area which is semi-desert with the little amount of rainfall. Kondoa District is one of the district in the Dodoma region that experience acute water supply problems. Kondoa town depends on a large natural spring namely Chemchem which yields 3,900 m^3 per day of water. With a daily demand of 4,940

m^3 per day in 2015 (KUWASA, 2015). This was enough to save about 80% of the population living in Kondoa town. This means that 20% of the deficit was expected in 2015. In late 2018, about 40% of demand was not met. This shows the increasing deficit in the water supply.Some efforts have been made by Kondoa Urban Water and Sanitation (KUWASA) board to ensure enough water supply to the community have been made in order to improve the water supply and sanitation services in Kondoa town and meet the present water demands. These efforts were expected to reduce the burden of water shortage to the surrounding community by supplying 4,832 m^3 per day and reducing the distance covered to the nearest water source by the majority of the households to 400 meters (KUWASA, 2015). Despite the efforts made, there is little success in reducing the problem of the supply of clean and safe water for the community of Kondoa urban ward which requires 6,895 m^3 of water per day. This study intended to assess the effectiveness of natural spring water in supplying clean and safe water for domestic use.

2.0 Literature Review

2.1 Theoretical Literature

This study is guided by the "Theory-based promotion of safe water consumption" that was put forward by Inauen in 2012. The framework shows that governmental and non-governmental agencies have been applying efforts and resources to promote health behaviours by increasing people's risk awareness. However, frequently these interventions show limited behaviour change effects, as proposed by the social cognition approach. Also, social behaviour is best understood as a function of people's perceptions of reality, rather than a function of an objective description of the stimulus environment" (Conner & Norman, 2005). This approach led to the proposal of various theories like; "Health Action Process Approach-HAPA (Schwarzer, 2008)", which all together reveal the existence of water supply problems and the related impacts to human life in the entire world.

2.2 Empirical Literature

Twaweza East Africa (2017) revealed that in the past 10 years Tanzania access to clean and safe water in rural areas has not increased. Also, the Twaweza East Africa (2017) revealed that the trend in data collected by Sauti za Wananchi (2017) showed that access to clean and safe water in Tanzania rural areas since 2005 has neither increased nor decreased. Out of 14 such surveys, 12 of them estimated that between 41% and 48% of households use an improved water source for their drinking water. Sauti za Wananchi data (2017) revealed that there is a decrease in access from 55% in 2014 to 46% in 2016. While the Ministry of Water reported that there is higher access to water between 50% and 60%.

Mahali *et al* (2017) study on Water, Sanitation and Hygiene Services in Tanzania. The study revealed that water supply and sanitation are still the problems. Over the past two decades, the access to clean and safe water in rural areas has not improved well. This was justified by the fact that the share of households in rural areas with access to clean and safe water changed only from 45% in 2005 to 57% in 2012. The Mahali *et al* (2017) study concluded that, based on the data obtained from their study from both survey and routine data, it is evident that in the past two decades' access to clean and safe water in Tanzania rural areas has not improved. Also, access to

basic school sanitation remained below the standards set. The Mahali *et al* (2017) study recommended that, the government and development partners should finance the WASH sector, construction of improved sanitation and hygiene facilities, improving school WASH, improvement of sanitation and hygiene policy and the WASH research agenda.

Kamara *et al.* (2017) study on Understanding the Challenges of Improving Sanitation and Hygiene Outcomes in a Community Based Intervention in Tanzania showed that about 50% of households had access to 15 or more litres of water within 30 minutes from protected water sources in the wet season while in dry seasons the percentage drops to 27%. They concluded that, the provision of water only in rural areas is not enough to address challenges associated with waterborne diseases. The Kamara *et al.* (2017) study recommended that the use of advanced techniques of water treatment and storage have a direct positive impact on infection diseases reduction, since the issue of clean and safe water supply covers a large part of people's life and their health.

Vairavamoorthy *et al.* (2007) studied challenges for Urban Water Supply and Sanitation in the developing countries and the result shows that, the challenges of clean and safe water supply vary from one area to another due to the differences in the rate of usage and available water sources. They concluded that, the planned action is highly needed to manage water resources effectively. In developing countries, the problems in urban areas are of particular concern since large sections of the community are living without clean and safe water and basic sanitation services. The Vairavamoorthy *et al.* (2007)study recommended that, the intervention must be considered over the entire urban water cycle including rethinking how water to be used and reused.

3.0 Research Methodology

3.1 The Study Area

The study was conducted in Kondoa urban ward (Figure 1) which is one among the five wards in the Kondoa District found at Latitude 4° 53' 59.99" S and Longitude 35° 46' 7.19" E. The area experiences shortage of water supply due to the nature of the geographical area which is semi-arid and it experiences little annual rainfall. The services found in the Kondoa urban ward include schools, dispensaries, bust stand, police station services and household buildings. There are also some economic activities including hotels, food vending, garages, guest houses, gardening, shops and marketing activities. All of these activities are supplied with water from one natural spring known as Chemchem spring.

The population and ethnicity of the Kondoa urban ward are made up by many tribes that occupy the area and perform different socio-economic activities. Kondoa urban ward tribes include Rangi, Chagga, Wasi, Fyomi and Iraque. The population of Kondoa urban ward according to the 2012 Tanzania National Census was 14,382. Kondoa climatic condition is semi-arid characterized by low annual rainfall that ranges from 600 mm to 800 mm. which led to recharge of spring water.

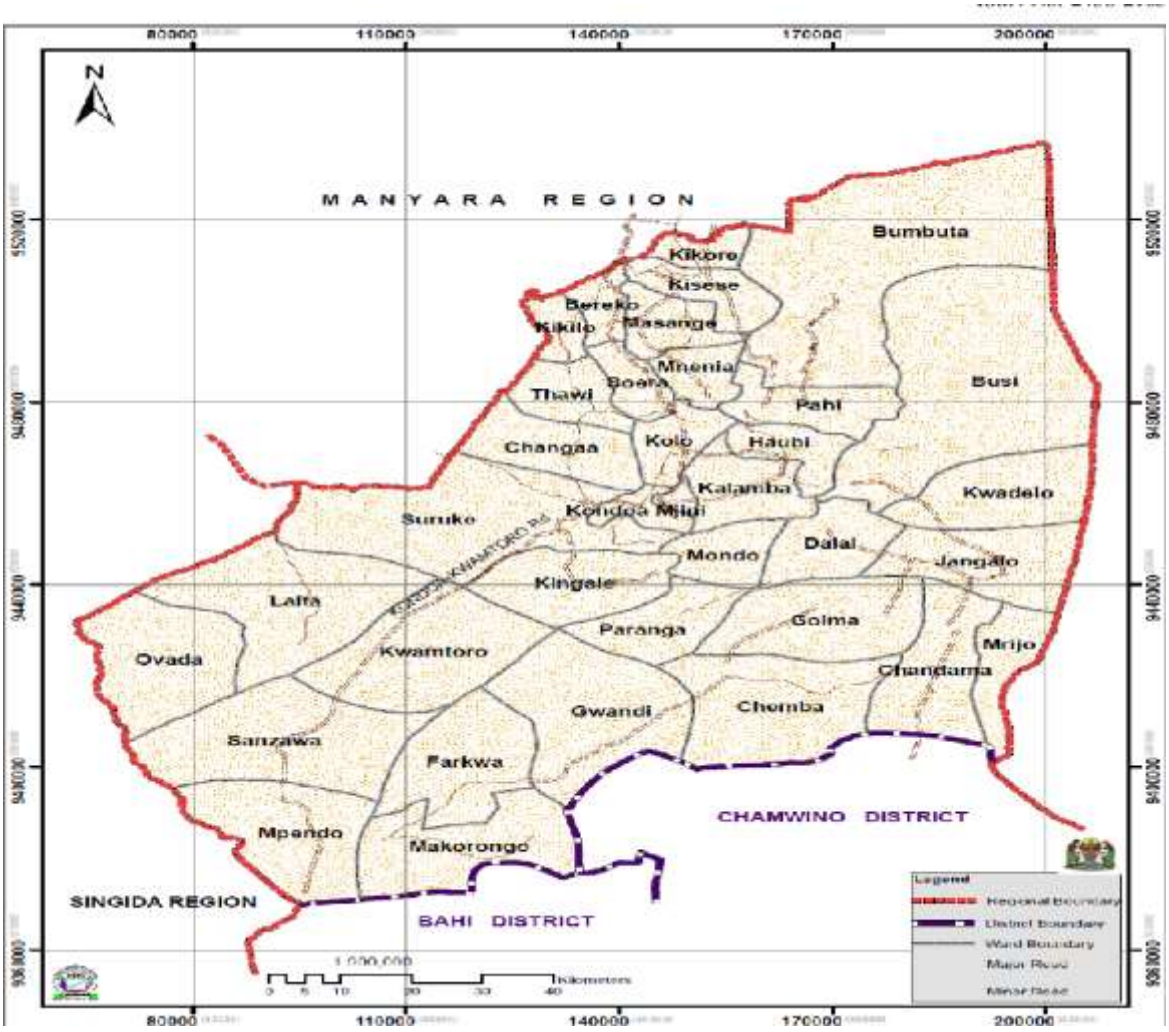

Figure 1. Map of Kondoa district showing administrative boundaries

3.2 Data Types, Sources and Design of the Study

This study used both qualitative and quantitative data from primary sources and secondary sources of data. The primary data were collected from households while secondary sources of data were collected from the district and ward reports, books and the internet. This study used a cross-section research design because it allows to collect data in a single location at a time.

3.3 Sampling Design and Procedures

The sampling techniques used were probability and non- probability sampling techniques to select the appropriate respondents. In probability sampling, the simple random sampling was applied to select the households while in non- probability sampling the purposive sampling technique was used to get responses from the key informants like the Assistance Managing Director of KUWASA and the Ward Executive Officer.

3.4 Sampling Frame and Sampling Unit

The sampling frame of this study was the list of all households who access water from the natural spring project while the sampling unit was the individual household who access water from the natural spring project.

3.5 Sample Size

The sample size was determined by using the estimations of the population that had access to water from the natural spring project during the period when the study was conducted. Hence, the sample size of 96 respondents was taken, which was obtained by using Kothari (2004) Formula.

$$n = \frac{z^2 * p * q}{e^2}$$

Whereby

$n =$ Sample size

$Z =$ The value of the standard variate at 95% confidence level (1.96)

$p =$ Sample proportion of households who access water from the natural spring project (5%)

$e =$ Marginal error or allowable error (10%).

$$n = \frac{(1.96)^2 * 0.5 * 0.5}{(0.1)^2}$$

$$= 96$$

The sample size that was used in this study is 96

3.6 Data Collection Tools and Methods

Qualitative and quantitative data were collected from primary and secondary sources. Primary data were collected from a household that access water from the spring project. The methods used for primary data were structured interview through a questionnaire tool, during direct observation checklist was used. Secondary data were collected from documentary reviews by using a checklist.

3.7 Data Processing, Analysis and Presentation

The collected data were processed and verified for prior analysis, where data was edited to omit errors and classified before coding into numerals to make them ready for data entry in the computer for data analysis using Statistical Product and Service Solution (IBM SPSS Statistics). During data analysis, the tool used was Statistical Product and Service Solution (SPSS). In this study the analysis of quantitative data was carried out by using Descriptive statistics, whereby the general tendencies in the data such as averages and frequencies were obtained. The results of analyzed data have been presented in the forms; tables, figures and word texts narration, while Qualitative data have been presented in words and direct quotes.

4.0 Results and Discussion

4.1 Demographic Information

The household respondents who participated in the study were asked to provide information concerns about their level of education, age, marital status and occupation. Table 1 and Table 2 show the distribution of demographic characteristics of respondents in the study area.

Table 1: Demographic information of respondents (Age and Education)

Variable	Frequency: Count (%)
Education Level	
Traditional	10 (10.6)
Primary	49 (52.1)
Secondary	31 (33.0)
Tertiary	4 (4.3)
Age	
15 – 25	26 (27.7)
26 – 35	41 (43.6)
36 – 45	15 (16.0)
46 – 55	6 (6.4)
56 – 65	4 (4.3)
66 – 75	2 (2.1)

The findings in Table 1 show that, the education level of respondents is as follows; 49 (52.1%) had primary level of education, 31 (33.0%) have secondary level, 10 (10.6%) respondents had traditional education**,** while 4 (4.3%) had tertiary level of education. Therefore, this implies that more than half of respondents have at least primary education 52.1%, while 10.6% had not attended any formal education. Then the age of respondents was classified into six groups, where 41 (43.6%) respondents aged between 26-35 ages, 26(27.7%) respondents were between 15-25 ages, 15 (16.0%) respondents aged between 36-45 ages, then 6 (6.4 %) respondents were between 46-55 age, while 4 (4.3%) were between 56-65 and 2 (2.1%) respondents were between 66-75 age group. This implies that many respondents' age was between 26-35 years as shown in Table 1, and it is the age where many have families and they need water for domestic use.

Table 2: Demographic Information (Marital Status and Occupation)

Variable	Frequency: Count (%)
Marital status	
Married	63 (67.0)
Single	19 (20.2)
Divorced	4 (4.3)
Widow	5 (5.3)
Separate	3 (3.2)
Occupation	
Peasant	76 (80.9)
Civil Servant	3 (3.2)
Businessman	15 (15.9)

The findings in Table 2 show that, 63 (67.0%) respondents were married, 19 (20.2%) respondents were single, 5 (5.3%) were widows, 4 (4.3 %) were divorced and 3 (3.2%) separated. This revealed that more than half of all respondents about 63% were married; hence they were directly aware of the need of water for domestic use in their households. The respondent's occupation data show that 76 (80.9%) were peasants, while 15 (15.9%) were businessman and only 3 (3.2%) were Civil Servants, therefore this revealed that most of spring water user were peasant.

4.2 Water Supply and Population Trends

Findings in Table 3 revealed that, as the population grows steadily so water supply increases, but that increases in water and population show that the population is growing faster than the increase in water. The 2020 data projected by this study, also still provide evidence that an increase in population is more than water increase thus leading to water scarcity.

Table 3: Trend of water supply from the spring and population growth trend 2015 to 2020

YEAR	2015	2016	2017	2018	2019	2020
Water supply m^3/day	1466	1771	1910	1814	2098	2129
Population Trend	32093	32767	33455	34157	34874	35569

4.3 Situation of Water from the Spring

The following Table 4 reveals the situation of water from the spring in the study area on the progress of water supply from the spring.

Table 4: Situation of Water from the spring

Use water from the spring	Frequency (Count/%)
YES	
NO	93 (98.9)
The situation of queuing in the public tape	1 (1.1)
Long queue	3 (3.2)
Short queue	88 (92.6)
Constant queue	1 (1.1)
Time stay in the queue accessing water	
Below 15 Minutes	45 (47.9)
15 Minutes	44 (46.8)
More than 15 Minutes	3 (3.2)
Total	**94 (100.0)**

The findings in Table 4 show that, about 93 (98.9%) respondents accepted that they use water from the spring, while only 1 (1.1%) do not use spring water. The result shows that the situation of queuing in the public tape does exist but is not serious were 88 (92.6%) of respondents said there is a short queue, while 3 (3.2%) respondent said long queue and only 1 (1.1%) constant queue. This also proved the time spent in the queue accessing water, whereby 45 (47.9%) said below 15 minutes, while 44 (46.8%) stay for 15 minutes and only 3 (3.2%) spend more than 15 minutes. Therefore, this implies that when water is released there is no long and constant queue in the sources, since results show that more than half of respondents use about 15 minutes. Hence this study concurs with MKUKUTA, since the recommendations given in MKUKUTA indicator for water supply is 30 minutes' limit on collection time, and results of this study show about 15 minutes are used in accessing water by respondents.

4.4 Cost of Water Purchase

According to the Poverty and Human Development Report 2009, The Household Budget Survey (HBS) provided new data on the household water expenditure for mean monthly expenditure on water and its share of total household expenditure by wealth quintile where its combined data on the share of total expenditure with excess to water supply, again by wealth quintile. Consider Figure 2 below on the situation of household expenditure on water.

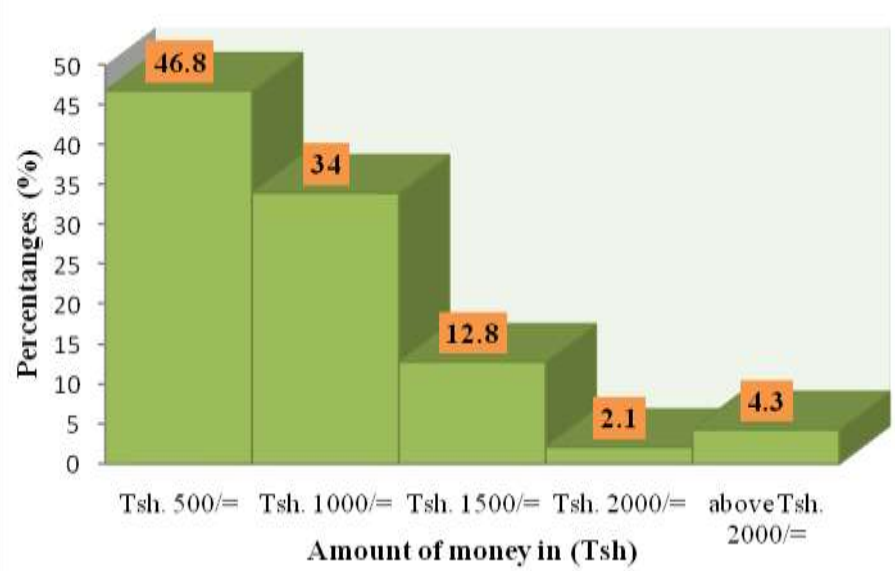

Figure 2: Amount Spent Buying Water per day (500Tsh/100L)

The data from the above Figure 1 show that, 44 (46.8%) spend Tsh.500/= buying water, 32 (34%) spend Tsh.1000/=, while 12 (12.8%) spend Tsh.1500/=, 2 (2.1%) spend Tsh.2000 and only 4 (4.3%) spend above Tsh. 2000 per day. This implies that many people use a large portion of their daily expenditure on accessing water, since around half of all households use 500 and 1000 on water, which is almost half of normal Tanzanian expenditure of 1 USD, whereby this situation influences poverty among the people. Therefore, this study concurs with the Poverty and Human Development Report 2009. This report concluded that, water accessibility is substantially higher for wealthier households than for the poor, yet poorer households are paying more for water than wealthier households as a proportion of the total household expenditure. The increased difficulty for the poor in accessing water is likely to contribute to this increased cost of living, as shown in this study.

4.5 Period Face Acute Water Shortage

The result of findings from Figure 3 show that, August- December is the period mostly faced with acute water shortage where 81 (86.2%) of all respondents revealed that, while about 13 (13.8%) of all respondents show April-July as the months face a shortage of water, therefore the data reveal that dry seasons (June, July, August, September, and October) are the most periods with acute water shortage, hence during dry seasons people cannot get water from any other sources like rainfall.

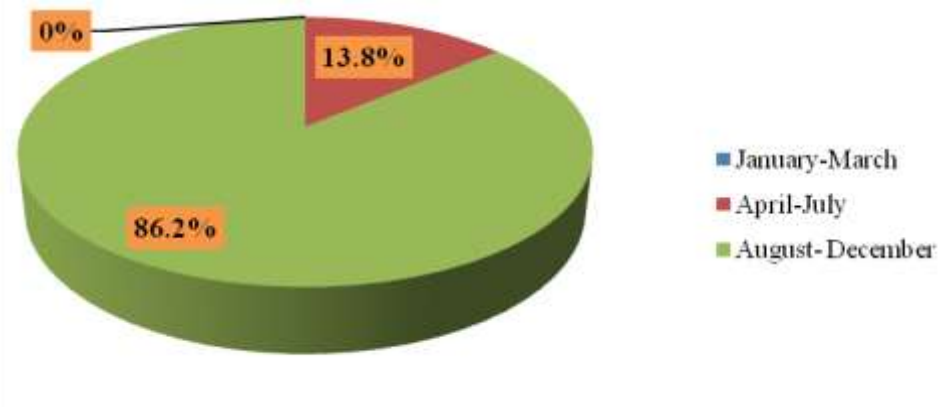

Figure 3: The periods that face acute water shortage

4.6 Situation of Water Infrastructure and Condition of the Water from the Spring

This study concurs with the study conducted by (Tettamanti, 2007) in Hai District in the Kilimanjaro region where 200,000 people in 55 villages are served by a gravity water system from sources in the rainforest on the slope of the Mount Kilimanjaro whereby until the early 1990s the water system was in bad shape. Local communities did not maintain the infrastructure, water quality was poor and some systems failed to provide water.

Table 5: Water Infrastructure in an Area and the Situation of the Water from the Spring

Situation of water infrastructure in an area	Frequency (Count/ %)
Good	7 (7.4)
Satisfactory	32 (34.0)
Unsatisfactory	55 (58.5)
Situation of the water from the spring	
Moderate	74 (78.7)
Decreasing	19 (20.2)
Increasing	0 (0.0)

The findings in Table 5 show that, the situation of water infrastructure in an area is unsatisfactory, since more than half of respondents about 55 (58.5%) revealed it while 32 (34.0%) respondents show that infrastructures are in a satisfactory state, while 7 (7.4%) of all respondents said infrastructures are good. Data further revealed that 78.7% of respondents said that access to water from the spring is moderate while 20.2% said it is decreasing, and no one said it increases. This implies that there is a need of having good water infrastructures and maintaining them since they lead to loss of water before reaching to the households. Moreover, the National Water Policies of 1991 and 2002 emphasized local participation and ownership as well as payment for water and metering as used in Hai district to turn the situation of infrastructure good. Hence these solutions which have been applied by Hai district can be used also in Kondoa urban ward, since the infrastructures seem unsatisfactory and water supply is not increasing while people increase, and seem moderate because there is high leakage of water in the way from the source to the households.

4.7 Water Rationing and Coping Strategy by the Government

According to United States Geological Survey (USGS) 2011 Washington Water Science Center Glossary, the coping strategies used to cope with water rationing were to store water for cleaning and bathing, use dish pans to wash and rinse dishes, clean and do laundry when the water is on, use easy cleaning solutions, conserving water in the shower and conserving water in the garden. Again, in order to reduce the time required for fetching water and to encourage the use of safe water sources, the Sphere Project recommended that no more than 15 minutes be spent in water access points.

Table 6: Water rationing and kind of the protected source of water established by the government

Water rationing	**Frequency (Count/%)**
YES	
	81 (86.2)
NO	13 (13.8)
Months have water rationing	
January-March	1 (1.1)
April-July	11 (11.7)
August- December	69 (73.4)
Kind of the protected source of water established	
Natural spring	85 (90.4)
Deep wells	1 (1.1)
Boreholes	0 (0.0)
Nothing	8 (8.5)

The findings from Table 6 show that, 81 (86.2%) of respondents said water rationing does exist and 13 (13.8%) said there is no water rationing, 69 (73.4%) of respondents said water rationing exists in August- December, while in April-July 11 (11.7%) and January-March 1 (1.1%). In order to solve the problems of water rationing, there are some kinds of protected source of water established, whereby the respondents' responses show that, 85 (90.4%) said natural spring is the major alternative source, while 8 (8.5%) said deep wells, and 1 (1.1%) said nothing was established to solve the problem especially by the government. However, this does not concur with the study conducted by United State Geological Survey (USGS) 2011, Washington Water Science Center Glossary, whereby they suggest the coping strategies with water rationing were to store water for cleaning and bathing, use dish pans to wash and rinse dishes, clean and do laundry when the water is on, use easy cleaning solutions, conserving water in the shower and conserving water in the garden, which is different to these study strategies suggested by the respondents.

Table 7: Occupation and Distance of accessing water apart from spring during the dry season

Variables	Less than 400m	At 400m	More than 400m	Total
Occupation				
Peasant	9 (9.6%)	11 (11.7%)	56 (59.6%)	76 (80.9%)
Civil Servant	0 (0.0%)	2 (2.1%)	1 (1.1%)	3 (3.2%)
Businessman	2 (2.1%)	4 (4.3%)	8 (8.5%)	14 (14.9%)
Total	**11 (11.7%)**	**17 (18.1%)**	**65 (69.2%)**	**94 (100.0%)**

The results in Table 7 show the relationship between the respondent's occupation and the distance of accessing water apart from spring during the dry season, where by the results show that most of peasants 56 (59.6%) walk more than 400m, and 11 (11.7%) at 400m, with 9 (9.6%) less than 400m, while most of civil servant 2 (2.1%) at 400m, and 2 (2.1%) at 400m, then most of businessman 8 (8.5%) also walk more than 400m, 4 (4.3%) at 400m, and 2 (2.1%). Therefore, it reveals that many respondents 65 (69.2%) walk more than 400m in accessing water during the dry season apart from spring. Hence this shows that the situation is different from Tanzania National Water Policy of 2006which recommended that the household should access water within a distance of 400 meters.

4.8 Time spend on accessing water from the sources of water during the dry season

The findings from Figure 3 show that, many respondents 65 (69.1%) walk for more than 1 hour looking for water during dry season, where 26 (27.7%) walk in 1 hour, and only 3 (3.2%) spend less than1 hour. This implies that the community spends much time looking for water during the dry season, since more than half of the total respondents shows that they spend more than 1 hour.

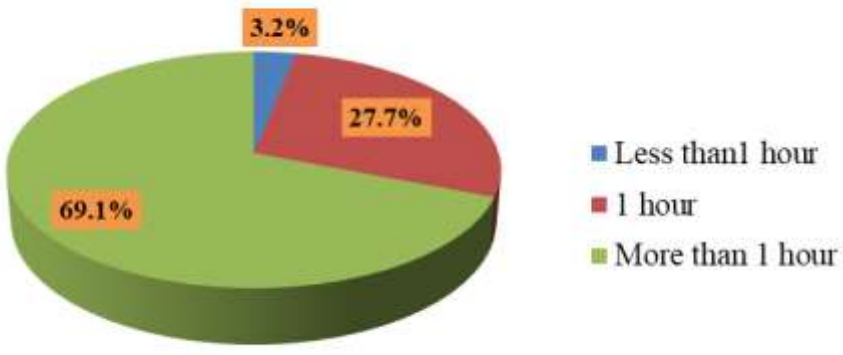

Figure 3: The time spent in accessing water during the dry season

Table 8: Water treatment

Water treated from the contamination	Frequency (n %)
YES	
NO	9 (9.6%)
Not known	13 (13.8%)
	72 (76.6%)
The water borne disease ever suffered	
Dysentery	1 (1.1%)
Diarrhea	42 (44.7%)
Typhoid	51 (54.3%)
Source provides treated water apart from Spring	
Boreholes	1 (1.1%)
Rain water	27 (28.7%)
Local wells	32 (34.0%)
None	34 (36.2%)

Information provided in Table 8 shows the water safety and waterborne diseases in the study area. It is evident that, many respondents have no idea if water is always treated for the contamination, whereby 72 (76.6%) said they are not aware, while 13 (13.8%) said No and 9 (9.6%) said Yes. Further, this shows that they use water which is not treated from contamination as revealed by the existence of various waterborne diseases in the area where the data shows that, 51 (54.3%) suffered from typhoid, 42 (44.7%) diarrhea and 1 (1.1%) dysentery, whereby both typhoid and diarrhea are caused by drinking and using contaminated water. On the other hand, the results on sources provide treated water apart from spring show that, 32 (34.0%) of respondents said local wells, 27 (28.7%) said rain water, 1 (1.1%) said boreholes, while 34 (36.2%) said none, meaning that there is no other source that provides treated water. This study concurs with Bjorn (2001), whose study was conducted in other areas of Tanzania in 2009, and findings revealed incidences of waterborne diseases relate to use of contaminated water. For instance, in Hai district in 2002, the incidence of waterborne diseases had declined substantially compared to the early 1990s, and the situation changed more from 2009 after starting the use of water which is free from the contamination.

4.9 The Coping Strategies Used when water is not Sufficient

Accordingto Ravindranath (2012) the study carried out in Tanzania by the Ministry of Water and Irrigation (which was collected by a District Water Engineer and Urban Water and Sanitation Authority), the findings showed that, for urban areas, survey data are consistently higher for household access that are not connected to the formal water supply network and access water from neighbours protected wells or boreholes.

Tables 9: Coping Strategies used when water is not sufficient

Variable	Frequency (count %)
Buying from water vendors	19(20.2)
Fetching from the constructed wells	10(10.6)
Walking long distance to find water from wells	64(68.1%)

The findings in Table 9 shows that 64(68.1%) respondents walk a long distance to find water from wells, 19(20.2%) respondents buy from water vendors and only 10(10.6%) fetch from the constructed wells. This implies that respondents spend a long time to walk long distance to find water from the well as a coping strategy used when water is not sufficient. This result contradicts with (Ravindranath, 2012) who found that coping strategies which were being used are different with this study, because the strategies used show that people walk a long distance to find water from local wells and buy from water vendors. Hence the differences can be due to the nature of the geographical area and its characteristics in terms of what other sources of water found in the area which they use.

5.0 Conclusions and Recommendations

5.1 Conclusion

The study concludes that, people have been facing water rationing for a number of days, leading to adopting other coping strategies to make sure that they obtain enough water per day. These strategies included walking a long distance to find water from unprotected wells. Finally, the study observed that the services offered by the spring project are not much effective compared to the demand for water due to steady population growth in the urban as well as poor infrastructure.

5.2 Recommendations

The following recommendations are suggested

i. Improvement of water infrastructure: Kondoa Urban Water Supply and Sanitation (KUWASA), Kondoa Town Council (KTC) and Kondoa District Council (KDC) should improve the water infrastructure by repairing old ones and establishing new water infrastructure systems. Since many areas receive little water from the source because of the old existing water systems which face water leakage during supply.

ii. Establishment of other water sources: Kondoa Urban Water Supply and Sanitation (KUWASA) should establish more water sources which will lead to solve the problems of time taken and distance travelled during the dry season. For example, Ibra and Tura streets, experience water scarcity which compel the majority to travel more than four kilometres to access water for domestic uses

iii. Environmental conservation: Community has to be involved in the environmental conservation for the protection of spring especially spring area should be highly controlled since it needs high density forest. This can be done through planting trees around the spring and not cutting trees which preserve the spring.

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