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Original Research Article

A community based cross sectional study to assess the drinking water handling and management practices, sanitary practices at the household level in Sullia taluk, Karnataka

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ABSTRACT

Background: The Millennium Development Goals (MDGs) - 7 aimed to reduce by half the proportion of population without sustainable access to safe drinking water and basic sanitation by 2015. Without access to clean water and basic toilets, and without good hygiene practices, a child's survival, growth and development are at risk. This study was conducted to assess the drinking water management and handling practices at household level of Sullia Taluk of Karnataka which would give an insight into drinking water management and handling practices in this area. Also the present study is planned to determine the sanitary practices in the households of Sullia Taluk.
Methods: 260 houses were sampled using a probability proportionate to sampling size . A cross sectional study was done using a semistructured questionnaire to assess water handling, water management and sanitary practices. Free chlorine in the water was assessed by O- Toluidine.
Results: Main source of drinking water was protected dug well in 31.5% and 75.3% did not have any alternate source of drinking water. 92% of those who stored water in overhead tanks and sumps did not clean them within seven days. 14% of the households did not use any of the water treatment methods before drinking. There was no free chlorine in the water of any of the households . 4% did not wash their hands with soap post-defecation. 28% of the households threw their waste indiscriminately around their house. 92% had cattle in close proximity to their house. None of the households practiced open field defecation.
Conclusions: Health education is very important to prevent the incidences of water and sanitation related diseases. Emphasis needs to be given to behavioural change communication to create awareness among the households regarding the importance of water and sanitation practices.

Keywords: Water handling, Water management, Sanitary practices

INTRODUCTION

Water and sanitation are not just essential to human development and well-being but also critical to the achievement of other development objectives such as adequate nutrition, gender equality, education and the eradication of poverty. Access to safe water and sanitation is a human right, as recognized in 2010 by the United Nations General Assembly. As part of global health and development agenda, The millennium development goals (MDGs)- 7, target 10 also aimed to reduce by half the proportion of population without sustainable access to safe drinking water and basic sanitation by 2015.[1]

Without access to clean water and basic toilets, and without good hygiene practices, a child's survival, growth and development are at risk.[2] Diseases related to water and sanitation are one of the major causes of death in children under five. Unsafe drinking water, inadequate availability of water for hygiene and lack of access to sanitation together contribute to about 88% of deaths from diarrheal diseases.[3] Under-nutrition is associated with repeated diarrhoea or intestinal worm infections as a direct result of inadequate WASH (water, sanitation and hygiene) conditions. A vicious cycle exists between diarrhoea and under-nutrition, especially for children.[2]

A significant proportion of water may be contaminated at the source itself and the local geographical conditions may have a role to play in it. Hence, water treatment assumes utmost importance in order to ensure the safety of the water consumed. At the community level, it is the responsibility of the municipalities to chlorinate the water being supplied to the households and public taps. Also it is up to the individual household to ensure that the drinking water they consume is adequately safe.[4]

According to national family health survey-4 (NFHS-4) in Karnataka, 11.1% of rural households did not have an improved source of drinking water[5]. In India, 66% of the rural population practices open air defecation. Despite comprehensive programs like total sanitation campaign, Swacch Bharath Mission open defecation still remains the predominant norm and poses one of the biggest threats to the health of the people.[6]

Thus this study was conducted to assess the drinking water management and handling practices at household level of Sullia taluk of Karnataka which would give an insight into drinking water management and handling practices in this area. Also the present study is planned to determine the sanitary practices in the households of Sullia taluk.

METHODS

A cross sectional study was done between May 2016 and September 2016 in Sullia taluk of Dakshina Kannada district, Karnataka to assess the drinking water handling and management practices as well as sanitary practices. Approval from the institutional ethical committee was obtained before the start of the study. Initially a pilot study was conducted to assess the chlorination practices in the study area. It was found that 20% of the households used chlorination as one of the methods of disinfecting drinking water source.

Sample size was calculated using the formula 4pq/L2, considering p=20% and an allowable error of 7%. A design effect of 2 was applied to the sample size, and the final sample size was calculated to be 260.

A semi-structured questionnaire was used to collect data from the households. This questionnaire was a slight modification of the questionnaire provided by WHO "Core questions on drinking water and sanitation for household survey" to suit the local settings.[7]

The houses were sampled using probability proportionate to sample size. All the households were included. Houses which were locked at the time of survey and those who did not give consent were excluded from the survey.

After filling the questionnaire, the free chlorine in the drinking water of the households was determined using O-Toluidine testing method.

The final data obtained was analyzed using Microsoft Office Excel 2007 and IBM SPSS statistics 20.

RESULTS

Among the households interviewed, majority were Hindus (67.3%), followed by Muslims (80%), and Christians (1.92%). The socio-economic grading of the households in the study according to modified Kuppuswamy classification was as follows: upper lower class (48.84%), lower middle class (28.07%), upper middle class (20.38%), upper class (1.53%) and lower class (1.15%) (Table 1).

Table 1: Socio-demographic characteristics of the households.

S no.	Characteristics	Number (%) n=260
1	**Religion**	
	Hindu	175 (67.3%)
	Muslim	80 (30.76%)
	Christian	5 (1.92%)
2	**Socioeconomic status (modified kuppuswamy classification)**	
	Class I	4 (1.53%)
	Class II	53 (20.38%)
	Class III	73 (28.07%)
	Class IV	127 (48.84%)
	Class V	3 (1.15%)
3	**Type of family**	
	Nuclear	209 (80.38%)
	Joint	21 (8.07%)
	3 Generation	30 (11.53%)

The main source of drinking water among the households in the study was protected dug well (31.5%), followed by panchayath water (20.3%), bore well (17.3%). 75.3% of the households did not have any alternate source of drinking water, of which majority belonged to Upper lower class of socio economic status (Table 2).

About 62.3% of the households surveyed, used buckets/drums to store water. Other methods of storage were overhead tanks (35%) and sumps (2.69%). 91.83% of those households who store water in sumps and

overhead tank do not have the habit of cleaning it once in seven days (Table 3). Most of them were of the opinion that cleaning them once a month was enough.

Table 2: Drinking water handling and management practices.

S no.	Water handling and management practices	No. (%) N=260
1	**Main source of drinking water**	
	Protected Dug well	82 (31.5%)
	Unprotected Dug well	36 (13.8%)
	Public Tap	39 (15%)
	River/Pond water	5 (1.9%)
	Bore/ Tube well	45 (17.3%)
	Panchayath water into the household	53 (20.3%)
2	**Alternate source of drinking water**	
	Bore well	15 (5.7%)
	Panchayath water	32 (12.3%)
	River water	6 (2.3%)
	Well water	11 (4.2%)
	No source	196 (75.3%)
3	**Storage of drinking water**	
	Buckets/Drums	162 (62.3%)
	Sumps	7 (2.69%)
	OverHead Tank	91 (35%)
4	**Frequency of cleaning water storage sump/drum/bucket/overhead tank**	
	Less than 7 days	149 (57.3%)
	More than 7 days	111 (42.69%)
5	**Water treatment methods used among households**	
	Boiling	200 (76.92%)
	Water Purifier / Water Filter	7 (2.69%)
	Boil + Water Filter	15 (5.76%)
	Nothing	37 (4.23%)
	Straining with a cloth	1 (0.38%)
6	**Storage of boiled water**	
	Different well maintained vessel	160 (74.41%)
	Same vessel	55 (25.58%)
7	**Practice of dispensing water from storage vessel for drinking purpose**	
	Pouring into the glass from the vessel	181 (69.61%)
	Dipping the glass	61 (23.46%)
	Using a tap	18 (6.92%)
8	**Result of orthotoluidine test**	
	Positive	-----
	Negative	260 (100%)

Table 3: Stratification of place of water storage based on the frequency of cleaning.

Place of water storage	Less than 7 days No. (%)	More than 7 days No. (%)	Total No. (%)
Buckets/ drums	141 (54.23)	21 (8.08)	162 (62.31)
Sump	2 (0.77)	5 (1.92)	7 (2.69)
Overhead tank	6 (2.31)	85 (32.69)	91 (35)
Total	149 (57.31)	111 (42.69)	260 (100)

Table 4: Stratification of socio economic class based on the water treatment method.

Water treatment method	Class 1	Class 2	Class 3	Class 4	Class 5	Total
Nothing	0	8 (21.62%)	9 (24.32%)	19 (51.35%)	1 (2.7%)	37

Table 5: Sanitary practices followed by the households.

Sno.	Practices	No. (%)
1	**Practice of open field defecation**	
	Yes	0 (0%)
	No	260 (100%)
2	**Practice of hand washing with soap post defecation**	
	Yes	250 (96.15%)
	No	10 (3.84%)
3	**Distance of the animal shed from the drinking water source**	
	Less than 15 metre	36 (92.3%)
	More than 15 metre	3 (7.69%)
4	**Provision of sanitary latrine**	
	Pit with cover	254 (97.69%)
	Septic tank	6 (2.3%)
5	**Disposal of solid waste**	
	Indiscriminately thrown	73 (28.07%)
	Pit with cover	38 (14.61%)
	Burnt in a houshold pit	92 (35.38%)
	Collected by panchayath	57 (21.92%)
6	**Disposal of animal waste**	
	Open field	22 (56.41%)
	Manure	11 (28.2%)
	Thrown into a pit and covered	6 (15.38%)
7	**Disposal of sullage**	
	Open field	135 (51.92%)
	Covered pit	125 (48.07%)
8	**Disposal of child's stool**	
	Children used toilet	18 (33.33%)
	Rinsed into toilet	28 (51.85%)
	Garbage	3 (5.55%)
	Open air	1 (1.85%)
	Others	4 (7.4%)

76.92% of the households boiled water prior to consumption, 5.76% of the households boil the water first followed by filtering the water by candle filters, 2.69% of the households used either water filter/ water purifier, 14.23% of the households did not use any water treatment methods before consumption, of which majority (51.35%) belonged to lower socio economic class (Table 4).

It was found that 74.41% of the households' stored boiled water in a different well maintained vessel, 55% stored in the same vessel. 69.61% of the households drank water by pouring it to a glass from the vessel, 61% dipped glass into the vessel and 6.92% had a tap from which water was taken (Table 2).

The free chlorine test conducted using O – toluidine reagent was negative in all the households, indicating that there was no free chlorine in the drinking water (Table 2).

None of the households surveyed practiced open field defecation. Out of 260 households studied, 10 (3.84%) of the households did not practice hand washing with soap post defecation. Remaining 250 (96.15%) households had the practice of hand washing with soap post- defecation (Table 5).

Throwing the solid waste into the pit and then burning it (35.38%) was the most common method of solid waste disposal practiced by the surveyed population. 28.07% of the households throw the waste indiscriminately (Table 5).

Table 6: Mosquito breeding places around the house.

S.no.	Mosquito breeding places around the house	No. (%)
1	Present	127 (48.84%)
2	Absent	133 (51.15%)

39 households in the survey had pet animals in their houses. Most of the households (56.41%) left the animal feces in the open field around their house. 92.3% of the households had cattle and the cattle shed was located at a distance less than 15 m from the drinking water source

(Table 5). 51.15% of the households had no mosquito breeding places around the house (Table 6).

DISCUSSION

This study assessed the sources and the safety of the water consumed by the population. Similar to this study, a study done by JMP WHO in 2015 showed that 91% of the world's population used drinking water from improved sources.[1] The national family health survey-4 (NFHS) showed that 89.3% of the population of Karnataka had access to an improved source of drinking water.[5] Our study found that 85.54% of the population had access to improved source of drinking water. The result is comparable with the international and national values denoting the adequacy of the safety of the source of water.

NFHS-3 showed that 45% of the people in the state of Karnataka do not treat drinking water prior to consumption.[8] Study done by Mithra et al in an urban area in South India found 5% of the population did not use any water treatment method.[4] Our study showed that 14% of the population did not use any method to treat water in their households. All these belonged to lower socio economic status and it could lead to higher chances of water borne diseases among them.

The lack of free chlorine in the drinking water of all the households in our study, points towards the chances of contamination of the drinking water. So, the source alone is not sufficient to provide safe and healthy water supply to the houses. This should be supported by the treatment practices and storage practices of drinking water.

In our study, open defecation was not practiced by any of the households. This is in contrast to a study done by Pachori in Salem, where open defecation was a common practice.[9]

Study done by JMP WHO in 2015 showed that 68% of the world's population had improved sanitation facilities.[1] The NFHS 4 showed that 57.8% of the population of Karnataka had improved sanitation facilities. Our study found that all the households had improved sanitation facilities[5].

Survey done by Ministry of statistics and programme implementation found 50% urban households and 6.3% in rural households deposited their garbage in a community dumping spot.[10] Our study found that 35.38% of the households dumped their waste into a pit and then burn it.

Washing hands after defecation is one of the most effective ways to prevent gastrointestinal parasitic infections. Study done by Pachori in Salem found that 66% of the households washed hands after toilet with soap.[9] In our study 96% of the households washed hands after defecation.

The practice of tethering animals close to human dwellings and the consequent proximity to animal faecal matter further enhances the risk of contamination of drinking water. Our study showed that, in 92.3% of the population, the animal shed was located less than 15m from the water source.

CONCLUSION

Majority of the households in the study area had access to improved source of drinking water. But few households practiced unhealthy storage and treatment practices like cleaning the overhead tank/ sumps once a month or once in 15 days, not treating water prior to consumption, dipping the glass into the water drum. Absence of free chlorine suggests the need for attention by the concerned authorities and the households.

Sanitary practices were found to be satisfactory in the majority of the surveyed population. Emphasis should be made on constructing animal shed (>50feet/ 15m) away from the drinking water source.

Health education is very important for better use of existing facilities and also to prevent the incidences of water and sanitation related diseases. Emphasis needs to be given to behavioural change communication to create awareness among the households regarding the importance of water and sanitation practices by using various media for education.

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