Original Research Article

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Assessment of household water treatment and storage practices

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ABSTRACT

Background: Maintenance of drinking-water quality is a pillar of primary prevention and continues to be the foundation for the prevention and control of waterborne diseases. Improved water supply and sanitation, and better management of water resources, can boost countries' economic growth and can contribute greatly to poverty reduction. The objective of the study was to assess household water treatment and safe storage (HWTS) practice.

Methods: A cross-sectional study was conducted for a period of 2 months. Total of 250 household were surveyed under the UHTC. Data was collected using WHO toolkit for monitoring and evaluating household water treatment and safe storage programme. Descriptive analysis was done.

Results: Majority had piped connection (32%) followed by public standpipe (31.2%), hand pump (27.6%) as source of water. 60% had knowledge about boiling followed by chlorination 27%, membrane filters 22.4%. Majority i.e. 63% of the participants had thought boiling as the best method for disinfection of drinking water.

Conclusions: Majority had piped connection, Maximum kept water container clean and covered. Only one fourth of the total household surveyed suffered from diarrhea in last 6 months.

Keywords: Household water treatment, Safe water storage, Safe water extraction

INTRODUCTION

Water is essential for survival of all life forms. Therefore human settlements chose to settle close to fresh water source. With progression of time, our population has increased many folds but availability of fresh water supplies remained constant, creating an ever-increasing pressure on it. The quality of drinking-water is a powerful environmental determinant of health. Maintenance of drinking-water quality is a pillar of primary prevention for more than 150 years and continues to be the foundation for the prevention and control of waterborne diseases. Safe and readily available water is important for public health, whether it is used for drinking, domestic use, food production or recreational purposes. Improved water supply and sanitation, and better management of water resources, can

boost countries' economic growth and can contribute greatly to poverty reduction. In 2010, the UN General Assembly explicitly recognized the human right to water and sanitation.³

Sustainable development goal target 6.1 calls for universal and equitable access to safe and affordable drinking water. Globally in 2015, 2.1 billion people were without safely managed drinking water services. These includes 1.3 billion people with basic services, meaning an improved water source located within a round trip of 30 minutes, 263 million people with limited services, or an improved water source requiring more than 30 minutes to collect water, 423 million people taking water from unprotected wells and springs and 159 million people collecting untreated surface water from lakes, ponds, rivers and streams.³

According to NFHS 4 (2015-16) more than two-thirds of households in every state/UT (except Manipur) have access to an improved source of drinking water, and more than 90% of households have access to an improved source of drinking water in 19 states/union territories.⁴ Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhea, dysentery, hepatitis A, typhoid, and polio. Nearly 842 000 people and 361 000 children aged under 5 years are estimated to die each year from diarrhea as a result of unsafe drinking-water, sanitation, and hand hygiene.³ Although communities may have access to piped water at home, it may be contaminated by defects in the distribution system. In addition water can become contaminated by unsafe consumer storage and handling practices at the household level.⁵

Therefore until safe, reliable piped in water is available to each household, interim measure such as household water treatment and safe storage practices can be useful for prevention of contamination of water during collection, transport and use. Promoting household water treatment and safe storage (HWTS) can be a cost effective intervention in preventing waterborne diseases. The present study was carried out with the objective to assess household water treatment and storage practices.

METHODS

A cross-sectional survey was conducted from October 2017 to November 2017 at the field practicing area under UHTC, Dept. of Community Medicine, VIMSAR, Burla. The total survey area was divided into twenty five sectors (as per presence of anganwadi centres) and from each sector ten households were selected randomly, thus covering 250 households. One adult member from each household was selected as participant preferably head of the family and in case of his unavailability next immediate available resident was contacted for the interview. Data was collected by interview method and by observation using WHO toolkit for monitoring and evaluating household water treatment and safe storage programmes.⁶ Information regarding socio-demographic profile, various sources of drinking water, method of collection, purification and storage practices, knowledge regarding methods of disinfection and any past history of diarrheal diseases that occurred within last six months were obtained. The participants were explained about the purpose of study and consent was obtained. The study protocol was approved by the Institutional ethical committee (IEC), VSS IMSAR, Burla. Data collected were compiled, tabulated and analyzed using excel.

RESULTS

The age of the respondents ranged from 20 to 65 years (mean age 36.9 ± 12.3 years). Majority of them were female respondent constituting 75%. The average family size of the total household surveyed was 6 (SD= 2).

Table 1: Source, transport and storage of drinking water.

Sl. No	Variable	Frequency (250)	%
1	Source		
	Piped Connection	80	32
	Public Standpipe	78	31.2
	Borewell	16	6.4
	Well	7	2.8
	Hand pump	69	27.6
2	Transport method		
	Bucket	135	54
	Steel container	57	22.8
	Pipe	58	23.2
3	Water storage		
	Bucket	46	18.4
	Large drum	62	24.8
	Steel utensils	91	36.4
	Ceramic pots	13	5.2
	Multiple	38	15.2

Table 1 shows source of water for household, how they are transporting from source to household and storage vessel used. Among 250 households regarding source of water maximum had piped connection (32%) followed by public standpipe (31.2%), hand pump (27.6%). Main method of transport of water from source to their home was using bucket (54%) followed by pipe. Majority of them stored water in steel utensils (36.4%) followed by large drum (24.8%), bucket (18.4%), ceramic pots (5.2%)

Table 2: knowledge about HWTS methods (N=250).

Sl. No	Disinfection method	Frequency	%
1	Boiling	152	60.8
2	Chlorination	68	27.2
3	Ceramic filter	24	9.6
4	Membrane filter	56	22.4
5	Coagulant/flocculants	19	7.6
6	Cloth filter	10	4
7	Settling	18	7.2
8	None	52	20.8

Table 2 shows knowledge of participants about various disinfection methods for household water treatment. Out of total 250 participants around 60% had knowledge about boiling followed by chlorination 27%, membrane filter 22.4%. However around 21% of the participant had no knowledge about any of the above mentioned methods for household water treatment.

Table 3 depicts about the opinion of participants regarding best method for disinfection of household drinking water. Majority i.e. 63% of the participants had thought boiling as the best method for disinfection of drinking water, followed by membrane filter 13% and

chlorine tablets 6.8% only. Nearly 16% could not tell about the best method for disinfection of drinking water.

Table 3: Opinion of participant about best method for disinfection of household water.

Sl. No	Disinfection method	Frequency	%
1	Boiling	158	63.2
2	Membrane filter	34	13.6
3	Chlorine tabs	17	6.8
4	No knowledge	41	16.4
	Total	250	100

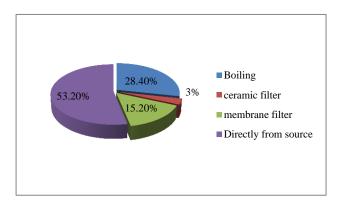


Figure 1: Treatment method for drinking water (n=250).

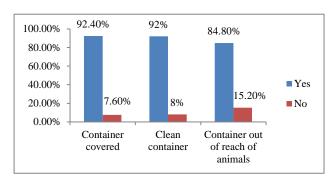


Figure 2: Observation of safely stored drinking water.

Figure 2 depicts observation of safely stored drinking water as practiced by the study participants. Out of 250 households, around 90% had stored drinking water in clean container and had covered it. However in 15% of the household drinking water container was within the reach of animals.

Figure 1 shows that majority (53.2%) of the household consumed water directly from the source for drinking. Treatment method like boiling was used by 28.4%, membrane filter by 15.2% and only 3% used ceramic filter.

In this study participants were asked to bring a glass of drinking water to check whether hand was touching in order to observe safe water extraction. It was found 50% had demonstrated safe water extraction

In nearly 90% of the households water used for drinking and cooking were changed daily. Around 73% of the households had no complain of any diarrheal diseases in the last six month whereas remaining 27% had complained about the same.

DISCUSSION

Access to safe drinking-water is essential to health, a basic human right and a component of effective policy for health protection. Household water treatment and safe storage (HWTS) is a proven intervention to improve drinking-water quality and reduce diarrhoeal disease. Vulnerable populations would be able to take care of their own water security once they are provided with the proper knowledge and tools to treat their own drinking water. Between the security of the secur

Water is one of the essential elements of our life. Safe and clean water and optimum sanitation facilities can prevent the occurrence of various infectious diseases and help in curbing the associated morbidity and mortality. The present study was conducted in urban area under the UHTC, Dept of community medicine VIMSAR, Burla with the objective to assess household water treatment and safe storage practice. Majority of the participants used public tap and stand pipe for water procurement. Similar results were found in a study done by Kuberan et al major sources of water procurement were public tap/stand pipe (42%) and tube well/borehole (37%). In another study nearly 42% (88/211) of households obtained their water for domestic use from the improvedsource ward reservoir. 10 In the present study maximum used bucket for transporting water from source to their household. Only 23% had piped in connection in their households. In a study done by Mynit et al, approximately 77% (68/88) of households had a piped in supply and the remaining households carried the water manually from the reservoir. 10 In our study 36% used steel utensils for storage of drinking water followed by 24% in large drums. Kuberan et al study done in a rural area.75% of them stored drinking water in wide mouth closed container.⁹ From a study by Mynit et al observations revealed the storage of drinking-water in clay pots (59/211, 28%), plastic bottles of 20-litre capacity that had previously been filled with purified water (93/211, 44.1%), and ceramic jars (50/211, 23.7%. 10 The present finding on observation of safely stored drinking water it was found that around 90% of the household kept their drinking water in clean, covered container and the container was out of reach of animals whereas study done by Mynit et al only 20% of drinkingwater containers were fully covered. 10 This finding was far less than what was found in present study, which may be due to difference in place of study, socioeconomic status and knowledge of the residents. In the present study regarding methods used for treatment of drinking

water, 53% of the household use water directly from source and of the remaining 47% household boiling was used by majority of the households followed by membrane and ceramic filter. In a study in rural area 45% of the participants were not following any methods of water treatment and among them half of the participants felt that water was already clean and did not require any additional treatment. In another study nearly a quarter of households used no method of drinking-water purification. Among households using drinking-water purification, 82% reported use of a cloth filter (which could easily be contaminated), and 33.3% reported boiling the water. Use of chlorine tablets and liquid chlorine for drinking-water purification was rare. 10 Around one fourth of the total household surveyed at least one member suffered from diarrheal diseases in last six months.

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Ethical approval: The study was approved by the Institutional Ethics Committee of VIREC, VIMSAR, Burla

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